NWRWAVES

(NOAA Weather Radio With All-hazards VTEC Enhanced Software)

Software Design Document

Version 2.4 (OB6 AWIPS Baseline)

November, 2005

NWRWAVES Development team
Peter Browning, Central Region Headquarters
Evan Bookbinder, WFO Pleasant Hill MO
Michael Hudson, WFO Pleasant Hill MO
Brian Walawender, WFO Topeka KS

Table of Contents

1 Introduction

The decision was made in the fall of 2004 to implement the Graphic Hazard Generation (GHG) capabilities in AWIPS as a means to implement Valid Time Event Coding (VTEC) in watch, warning and advisory products. This decision was allowed to go forward on the condition that GHG would replace the AWIPS Watch Warning Advisory (WWA) program. The WWA program included NOAA Weather Radio (NWR) Console Replacement System (CRS) formatting capabilities. Therefore, offices using WWA for CRS product formatting will need to use an alternative program. The GHG implementation plan called for the use of CAFÉ scripts as an interim solution. CAFÉ is a collection of approximately 47 different formatters that were designed as a short term solution for CRS formatting needs in the late 1990s.

CAFÉ is limited in its capabilities and has many well known deficiencies. These include a lack of product tracking and replacement functionality that utilize the MRD capabilities of CRS. To replace WWA, CAFÉ formatters would need to be upgraded to provide as a minimum, the capabilities available in WWA. The Central Region volunteered to field a team to update CAFÉ to be once again another short term solution for a baseline universal formatter for CRS in AWIPS.

The Central Region CAFÉ Improvement team was formed and quickly determined that designing and coding a replacement system was a better approach then trying to update the legacy CAFÉ scripts. This decision was based on the desire to utilize the new VTEC coding in products, which allows for using specific CRS options based on the phenomena and action code found in VTEC (CAFÉ only relies on the product identifier), and the need to track and replace CRS products using the Message Reference Descriptor (MRD) capabilities in CRS. With 47 independent scripts, each having their own configuration files and directory structure, major new code components would be needed and accessed by each of these scripts.

The NWRWAVES application provides a streamlined capability for CRS formatting that makes full use of the CRS and VTEC format capabilities. It provides a replacement for CAFÉ that will be much easier to maintain. It is presented here as a working prototype to replace both WWA and CAFÉ and be the starting point for a baseline AWIPS CRS formatter system.

This document serves as the Software Design Document (SDD) for the NOAA Weather Radio, Console Replacement System (CRS) baseline formatter application – NWRWAVES (NOAA Weather Radio With All-hazards VTEC Enhanced Software). NWRWAVES is a tcl application designed to run on AWIPS baseline software.

The NWRWAVES application reformats NWS operational text products into CRS-ready text products. A CRS-ready product contains a CRS header line. Information contained in the CRS header tells CRS how to process the product. NWRWAVES uses a configuration file to properly define the CRS header – based on the product type and event type.

2 Requirements

Requirements for a new CRS formatting capability have not been fully fleshed out. However, requirements listed in the table in Appendix B were identified from three sources; WWA, UFOR White Paper and CAFÉ documentation. Below is a list of those requirements that is available in NWRWAVES.

2.1 WWA Requirements

First the requirement driving this work is to close the gap between WWA CRS processing capabilities and those available with CAFÉ formatters. These requirements are (in no particular order):

Summary message by transmitter
Utilize MRD capability (replace, follow)
Tower specific products
Use VTEC to convert hazards to EAS codes (SV.W vs SVR)

2.2 UFOR White Paper Requirements

The UFOR white paper suggested requirements for a baseline CRS formatting and monitoring capability. Some requirements referred to improvements in remotely monitoring and altering programming on CRS through an AWIPS GUI. These requirements would be appropriate for an updated NWRBrowser GUI and are not listed here (see Appendix B).

Configurable by event type
Create customized lead-ins and trailers
Alert of formatter/software problems
Run formatter on a per product basis
Control tone and EAS alerting by time – blackout periods (per product)
GUI-based interface to adjust product configurations
Control destination of NWR message (pending vs. active) by product
Ability to not tone/EAS for cancellation/continuation statements

2.3 CAFÉ Requirements

If NWRWAVES is to also replace CAFÉ, then requirements can be determined by examining the CAFÉ capabilities.

Execute manually as well as by trigger or cron
Check for hung processes
Word replacement capability
Utilize NWRBrowser system

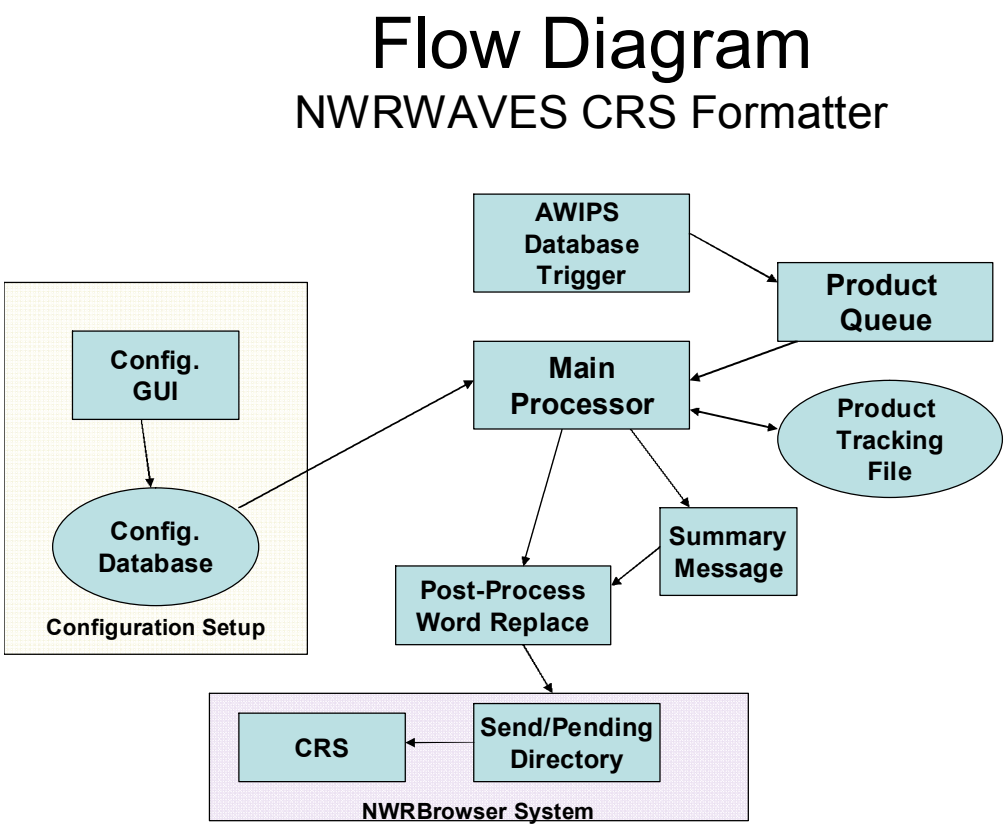
VTEC code stripped from products
Program Documentation
One instance of the program runs at a time
WMO headers stripped from products
CRS header created properly
Use a configuration file to define CRS header by product
CRS header configuration on a by product basis
Error reporting about bad configuration setup
On/Off capability for product
Duplicate product checking
Replace PIL with CRS PIL
Tone on one transmitter and not on others
Define zones by transmitter
Intro (lead-in) capability
Use/don't use headlines option
Issued time lead-in option
Alarm code options in CRS string
Interrupt code option
Active code option
Periodicity option
Send to CRS or flat file modes
Dual time zones properly formatted
$$ cutoff to text
&& use/don't use option
Debug logs generated
Areas to LAC conversion
Web address handling
Proper handling of range of zones (>)
Multiple blanks removed
Word replace file – convert of use CAFÉ
County and zone files
Spanish Language (T_SPA)
Zone and county substitution
CRS Tower ids defines with area codes

3 Design Documentation

3.1 Software Design

3.1.1 Process Flow

Here is an outline of the NWRWAVES program process.



More specifically:

- AWIPS database trigger spawns ***nwrwaves.csh*** script
  - Create QUEUE directory if does not already exist
  - Copy output from /data/fxa/trigger to the QUEUE directory, giving the PIL an additional timestamp in the filename.
  - Check to see if another version of nwrwaves.csh is running, or if nwrwaves.tcl is running – only allow one instance of either file to run at a time.
    - If it is running, wait 20 seconds and check again
    - If still running, assume script is hung and terminate it with kill command
    - Check again after 2 seconds, if still running use kill -9.

- Write program checksum to log file.
- Spawn nwrwaves.tcl

- ***nwrwaves.tcl*** is run to process any queued data
  - Open time stamped debug and log files for output in /DEBUG and /LOGS directory
  - Check to see if we're in test mode (TEST argument passed to nwrwaves.tcl)
  - Read in state node and local WFO IDs from environmental variables and AWIPS flat files
  - Read in transmitter and summary message config data from files written by setup GUI program
  - Copy the product from the QUEUE directory for archiving and quality assurance
  - Read a product from the QUEUE directory, parse the product into individual components and store into arrays:
    - Header, overview, MND date/time group
    - For each segment -- UGC codes, UGC expiration, VTEC information, headlines, body text, supplemental data
    - Check to see if product is WOU/WCN
      - If "NEW" WOU, combine all UGC segments, otherwise ignore product
      - If "NEW" WCN, exit (we're using the WOU to tone).
    - Read in product configuration info for that specific product or VTEC phenomenon
    - Get the issuance time from the product.
      - Used in an optional intro line and to determine whether alert tones should be silenced based on optional configuration blackout period
    - Get the CRS Expiration time for the header
      - UGC purge time first, then use product default if none found
      - Also calculate this number in "clock seconds" so that we can determine an expiration time for any applicable summary messages
    - For each VTEC line (if applicable), acquire a valid/unique MRD number based on VTEC ETN number and MRD numbers already in use in the VTEC_Summary.txt file. Filter out VTEC from marine products if configured to do so.
      - Used for MRD replace on CRS
      - Used to determine duplicate product storage
      - Create/modify/delete from VTEC_Summary.txt file as database for summary message generation and VTEC tracking information
    - Check to see if product is already expired -- if so, red banner message the user
    - Otherwise, loop over each transmitter to see if we have any matching counties

- If product is an upgrade/downgrade ("UPG" or "CAN" in 1st line of a multi-line VTEC segment), re-send upgraded or downgraded product to CRS with a 10 minute expiration time before processing the new event.
- Create a LAClist for that transmitter based on UGC and transmitter matches.
    - If no UGC, assume message is intended for all transmitters and use the first UGC code for each transmitter to send the message
    - Generate English phraseology of all counties/zones/marine zones affected on that transmitter. Used in optional intro and repeat statement. This function is also used in the summary message generation.
        - Uses UGCLookup.table files in the /bin directory
    - Based on product specific settings, combine requested elements into a message
        - Run message through post processor which includes word replacement file.
    - Add CRS message header/footer and copy to /ready or /pending directory depending on setting.
        - If product is WOU/WCN, create unique message, ignoring unreadable tabular data in product.
        - If test product (...TEST... or "T" VTEC), red banner message user and send to pending directory
        - Copy output to /OUTPUT directory
- Repeat process for each file in QUEUE directory
- Run summary message program
- Close debug/log files.
- Purge old files from DEBUG, LOGS and OUTPUT directories

There are no persistent processes associated with NWRWAVES. There are no modifications needed to existing persistent processes. See Appendix C for a detailed flowchart describing NWRWAVES module processes.

3.1.2 Database Usage

NWRWAVES reads and processes text products from the Informix/Postgres database by utilizing AWIPS text triggers process. The program does not directly read or write any messages to the Informix/Postgres database.

The program creates and maintains a flat file database of the VTEC products which it has processed. This database is used to create summary messages which contain active

watch, warning and advisory information, as well as for assigning unique MRD numbers for CRS message replacement.

3.1.3 Program Language

NWRWAVES uses the baseline Tcl/Tk software on AWIPS. A C-Shell script is also utilized by the AWIPS text trigger to capture a copy of the product and initiate the nwrwaves.tcl program. Bourne shell scripts are provided for purging at OB6 sites.

3.1.4 COTS/Freeware Usage

NWRWAVES utilizes seven Tcl/Tk libraries that are not provided with the AWIPS baseline of Tcl/Tk. These freeware libraries add additional capabilities for Tcl/Tk. These libraries are distributed with NWRWAVES and are stored in the NWRWAVES/bin directory. The seven libraries are:

/awips/adapt/NWRWAVES/bin/clocktime.tcl
/awips/adapt/NWRWAVES/bin/color_msgbox.tcl
/awips/adapt/NWRWAVES/bin/combobox.tcl
/awips/adapt/NWRWAVES/bin/dialog.tcl
/awips/adapt/NWRWAVES/bin/notebook.tcl
/awips/adapt/NWRWAVES/bin/pkgIndex.tcl
/awips/adapt/NWRWAVES/bin/UGC_VTEC_Decoder.tcl

There is no COTS software utilized in NWRWAVES.

3.1.5 Service APIs Required

textdb - The textdb process is utilized within the Informix text trigger process to obtain a copy of the product from the text database. NWRWAVES does not specifically make any calls to textdb.

fxaAnnounce – This routine is utilized to produce a banner message to alert AWIPS operators about formatter failure or miscoded products (including the processing of TEST messages).

transferNWR – not used by NWRWAVES. NWRWAVES instead copies the CRS ready product to either the /data/fxa/workFiles/nwr/ready directory for products configured to automatically go to CRS or /data/fxa/workFiles/nwr/pending for products configured to be delayed, requiring user intervention.

3.1.6 System Services Utilized

AWIPS Text Triggers – New triggers will need to be added to support NWRWAVES. The number of new triggers will vary greatly among sites, but will generally be from 20 to 30 triggers. At many offices, these triggers will be a one-for-one replacement for those triggers previously established by the CAFÉ program.

There are no machine specific dependencies.

3.1.7 WAN Usage

WAN is not utilized. NWRWAVES does not send data to the WAN.

3.2 Operability (User Interfaces)

NWRWAVES is designed to run without user interaction, since the program is spawned from the AWIPS text trigger process.

A graphical user interface is provided to create the setup files needed by NWRWAVES. Information about the setup GUI is provided in Appendix C.

3.3 Installation

No changes are needed to any national metadata files. The site AWIPS text trigger file will need to be modified to replace appropriate CAFÉ triggers with NWRWAVES triggers. This will require a trigger localization on the site's AWIPS system.

No changes will be made to any system runtime setup files. There are plans to add two crons to the AWIPS system. The crons will handle time purging of NWRWAVES files. No changes will be made to any core system services. Seven new freeware Tcl/Tk libraries will be provided with the install and will reside within the NWRWAVES directory structure.

New directories will be installed. The proposed location of the software is a new directory to be created in the /awips/adapt directory called NWRWAVES. The following subdirectories will be created:

/awips/adapt/NWRWAVES	Main software applications
/awips/adapt/NWRWAVES/bin	Additional Tcl/Tk libraries Program resource files

/awips/adapt/NWRWAVES/LOGS	30 day running log
/awips/adapt/NWRWAVES/QUEUE	Temporary storage of products to be processed
/awips/adapt/NWRWAVES/OUTPUT	30 day storage of CRS products produced by NWRWAVES
/awips/adapt/NWRWAVES/TEST	CRS output when program is run in test mode
/awips/adapt/NWRWAVES/DEBUG	30 days of comprehensive program input/output for program debugging use
/awips/adapt/NWRWAVES/ERROR	Tcl error logs created when NWRWAVES terminates abnormally
/awips/adapt/NWRWAVES/INPUT	30 day storage of products processed by NWRWAVES
/awips/adapt/NWRWAVES/browser	Software and configuration files for the NWRWAVES Browser
/awips/adapt/NWRWAVES/BACKUP	Saved off copies of the sites configuration files
/awips/adapt/NWRWAVES/SUMMARY	Temporary storage of summary message files

The NWRWAVES will be provided with a default configuration file. This file will be locally modified to identify CRS related parameters (transmitter IDs, LACs, etc.) as well as specific configuration information by product and VETC event type.

3.4 Performance

Testing has shown that minimal system load occurs when NWRWAVES is running. On average, the script takes less than five (5) seconds to run. The runtime is dependant on the number of segments within a product, the number of transmitters configured on CRS and the number of products in the QUEUE directory. Only one instance of the program is allowed to run at a time, and hung processes are detected and terminated by the next attempt to run the program.

NWRWAVES utilizes AWIPS text triggers. No other load is expected to be put on shared services. The AWIPS text triggers will be a one-for-one replacement of those triggers used by CAFÉ. Database loading is expected to decrease with NWRWAVES when compared to CAFÉ. CAFÉ made additional calls to the database using textdb reads.

Disk I/O from NWRWAVES is mainly from writing to the log, debug and archive files during program execution and then writing the CRS products to the NWRBrowser directories. There is no use of remote shell, rcp or other remote system calls. NWRWAVES will purge files from the log, debug and archive directories via cron in OB6, and on program execution in previous AWIPS builds.

NWRWAVES will be most active during severe weather episodes when numerous products are processed for CRS broadcast.

3.5 Hardware/Resource Usage Design

NWRWAVES does not require any additional hardware. NWRWAVES is a software applications program which runs on the AWIPS baseline hardware.

We propose that the software reside in the /awips/adapt/NWRWAVES directory. Since /awips/adapt is a NFS mount point, no additional links or mount points are needed. For pre-DX sites it is located on DS1. For DX sites it is mounted from NAS1.

The NWRWAVES program uses approximately 1 MB of disk space. An allotment of 40 MB is recommended to allow for 30 days of log, debug, input and output file retention.

The software does not use the Omniback tape drive, WAN or SBN and does not require any special hardware resources.

3.6 External Interfaces

No external interfaces are included.

3.7 General Design Assessment

NWRWAVES is basically a local applications program that has been developed by a team fro CR field offices. The program is being presented here as a prototype for what has been commonly referred to as UFOR (reference SREC OB7 task list).

Our opinion is that this prototype software will outperform the widely used CAFÉ suite of scripts for producing CRS ready products. The software is required to fully utilize VTEC and CRS capabilities and will replace WWA and most CAFÉ functionality. This software will serve as a first step toward a baseline CRS formatting capability in AWIPS. We clearly see that additional capability needs to be added to this prototype, and hope that this can be done incrementally. For example, a part of the CRS formatting capability is the AWIPS baseline NWRBrowser software. Improvements in the NWRBrowser software can work with the CRS formatter software to provide a fully functional capability.

3.8 Configuration Management

Since NWRWVAES scripts are not compiled. Checksum will be utilized to identify unauthorized changes to NWRWAVES. A checksum value is written to the master log file each time the program is executed. **The baseline checksum value for NWRWAVES v2.4 is 2712815031.** Any deviation from this value represents local modification to baseline AWIPS software.

The NWRWAVES setup GUI program assists with configuration management by limiting the options a site has in configuring the program. The GUI ensures that no errors result from manual editing of configuration files and provides on-line help for configuration options.

3.9 Assignment of Responsible Individuals

Primary development of NWRWAVES was authored by Evan Bookbinder, WFO Kansas City/Pleasant Hill, Missouri and Brian Walawender, WFO Topeka Kansas. Michael Hudson, WFO Kansas City/Pleasant Hill MO and Peter Browning, Central Region Headquarters assisted Evan and Brian with identifying requirements, logistics and testing of the software.

3.10 Documentation Assessment

Documentation for the installation and use of NWRWAVES is available online at:

http://www.weather.gov/ops2/crs/nwrwaves.php

3.11 Testing Assessment

3.11.1 Special Development Needs

Ideal testing of this software is to test it end-to-end setup the software on AWIPS and generate a high volume of data that is sent to a CRS system. This aspect of testing is important to see that CRS can indeed read the products without producing fatal results on CRS.

This environment was created at Central Region Headquarters. The BCQ AWIPS system has been configured to send products to a NWSTC CRS system which is used for training classes. This CRS does not have a transmitter attached to it, but is fully functional in processing CRS products. With the BCQ system configured in test mode, (which prevents the transmission of products from the system) a rapid production of warning

products and statements are generated and sent to CRS. A speaker has been provided at the AWIPS workstation so the tester can hear the results.

Additionally, the software can be run in a "test" mode. This mode does not send any products to CRS, but instead places them in the TEST directory in the NWRWAVES directory tree. Triggers have been established that run the program in test mode as real products are received. With this option, a site can test the NWRWAVES configuration prior to setting up operational triggers.

3.11.2 Alpha/Beta Testing

The NWRWAVES software was setup on an NWSHQ AWIPS test platform in June, 2005. This provided an opportunity to monitor system resource utilization, performance and validate CRS product generation capabilities, when a rigorous formal DT&E test procedure was run to validate NWRWAVES requirements.

In addition to NWSHQ testing, beta testing of the software was conducted at select field offices from August to October, 2005. This allowed for improvements in the software documentation, and the testing identified some critical problems not accounted for in developmental testing. As of November 1, 2005, eight NWS field offices have installed and configured NWRWAVES, and are using the software exclusively for all NWR formatting purposes (other than the formatting already provided by baseline hourly weather, climate and Riverpro applications). The need for additional formal testing beyond what has been done already is not anticipated.

3.12 Schedule

With the deployment of GHG, there is an immediate need to deploy the NWRWAVES program to improve CRS processing capabilities by utilizing VTEC coding. As mentioned above, significant alpha and beta testing has occurred, and as a result, a significant risk reduction was achieved. Furthermore, sites will transition from existing formatters to NWRWAVES on a product-by-product basis. NWRWAVES can be configured and switched to "operational" in a smooth manner; it is not a turn-key operation for all-or-nothing use.

NWRWAVES v2.4 will be distributed prior to OB6 – Phase 3 in steps. Eastern Region offices will be able to download, configure and begin using NWRWAVES in November, 2005. When this deployment is achieved successfully (and the risk assessment is very low), the software will be opened to the entire NWS in December, 2005 or January, 2006. The CR development team will support the software and identify bugs for a short period after national deployment is completed. The software support and maintenance will then be handed off to OOS as a supported replacement for CAFÉ.

4 Sustainability Plan

NWRWAVES was developed by field office personnel in the NWS Central Region. Therefore, there is not an existing mechanism by which future enhancements, bug fixes or capabilities can be built into NWRWAVES for future AWIPS builds.

Therefore, the following is a proposed sustainability model for future versions of NWRWAVES. It relies on oversight from the HQ CRS Program Office but keeps the development and coding of NWRWAVES in the realm of field office personnel.

- CRS program office manages trouble ticket list provided by the NCF, for all NWRWAVES problems, proposed enhancements and other adjustments as needed.
- CRS program office develops and prioritizes a requirements list (for a newer version of NWRWAVES) based on regional focal point feedback and day-to-day field office feedback.
- When this requirements list is derived (at least once annually to capture new proposed capabilities):
    - CRS program office manager tasks a solicitation for a "tiger team" from all NWS regions through the regional CRS focal points.
    - Regional focal points solicit within their regions for any personnel interested in participating on the NWRWAVES Development Tiger Team. Regions then submit the names (within a month of the CRS Program Office solicitation) of no more than two (2) interested personnel from their WFO's. These personnel MUST have a strong background in tcl/tk code development.
    - CRS program office manager makes a selection from these candidates, to form a development team that consists of the following:
        - One team leader (program manager) who will coordinate coding, testing, and documentation of NWRWAVES changes.
        - Two to three programmers who will work for the team leader to implement specific requirements given to the team from the list organized by the CRS program office.
    - Development team reviews within a one-month period the NWRWAVES SDD and user documentation, and also reviews the existing code (with abundant comments) to familiarize themselves with software logic and program flow.
    - Development team then works within a three-month window to develop new code for each item listed by the CRS Program Office.
    - Once code is complete, team leader submits the updated code to the CRS program office.
    - CRS Program Office performs rigorous 'alpha' testing of the new NWRWAVES version on the HQ test bed. Existing DT&E test procedures written during the development phase of NWRWAVES should be used and augmented as needed depending on what new capabilities are being added.
    - Additional alpha testing may also occur at regional offices.
    - Alpha testing phase will last around a month, depending on the number of problems encountered.

- Once alpha testing has been completed, CRS Program Office will coordinate with regional focal points, and deploy new beta version to a site in every NWS CONUS region. Further risk reduction takes place in the beta test, and any problems found are sent back to the Tiger Team for fixes.
- Once beta sites have successfully run NWRWAVES for a 30-day period, software is checked into the next version of AWIPS. Tiger team disbands.

Appendix A: NWRWAVES Files

This is a listing of the files that would be present in a typical install of NWRWAVES. Directory names are listed in bold typeface.

/awips/adapt/NWRWAVES
/awips/adapt/NWRWAVES/errorout.txt
/awips/adapt/NWRWAVES/Filename.last
/awips/adapt/NWRWAVES/NONVTECMRD.txt
/awips/adapt/NWRWAVES/NWRWAVESpurge.sh
/awips/adapt/NWRWAVES/removeExpiredNWR.sh
/awips/adapt/NWRWAVES/nwrwaves.csh
/awips/adapt/NWRWAVES/nwrwavestest.csh
/awips/adapt/NWRWAVES/nwrwaves_setup.tcl
/awips/adapt/NWRWAVES/nwrwaves.tcl
/awips/adapt/NWRWAVES/product.cfg
/awips/adapt/NWRWAVES/whatsnew.txt
/awips/adapt/NWRWAVES/VTEC_Summary.txt
/awips/adapt/NWRWAVES/NWRWAVES_RELEASE_ID
/awips/adapt/NWRWAVES/summary_cfg.CCC
/awips/adapt/NWRWAVES/transmitter_cfg.CCC
/awips/adapt/NWRWAVES/marine_cfg.CCC

/awips/adapt/NWRWAVES/bin
/awips/adapt/NWRWAVES/bin/clocktime.tcl
/awips/adapt/NWRWAVES/bin/color_msgbox.tcl
/awips/adapt/NWRWAVES/bin/combobox.tcl
/awips/adapt/NWRWAVES/bin/dialog.tcl
/awips/adapt/NWRWAVES/bin/notebook.tcl
/awips/adapt/NWRWAVES/bin/pkgIndex.tcl
/awips/adapt/NWRWAVES/bin/UGC_VTEC_Decoder.tcl
/awips/adapt/NWRWAVES/bin/UGClookup.table
/awips/adapt/NWRWAVES/bin/WordFile.txt
/awips/adapt/NWRWAVES/bin/relinkNWRWAVESBrowser.sh

/awips/adapt/NWRWAVES/browser
/awips/adapt/NWRWAVES/browser/admin.list
/awips/adapt/NWRWAVES/browser/browser.cfg
/awips/adapt/NWRWAVES/browser/browser.ini
/awips/adapt/NWRWAVES/browser/browser.tcl
/awips/adapt/NWRWAVES/browser/editors.cfg
/awips/adapt/NWRWAVES/browser/pils.list
/awips/adapt/NWRWAVES/browser/update.tcl

Once the program starts running, files will be generated in the start showing up in the following directories with the format indicated.

/awips/adapt/NWRWAVES/DEBUG
/awips/adapt/NWRWAVES/DEBUG/YYMMDDHHMMSSdebug.txt

The DEBUG directory contains the last 30 days of detailed debug log files from the formatter output. Files older than 305 days are purged automatically by the program.

/awips/adapt/NWRWAVES/LOGS
/awips/adapt/NWRWAVES/LOGS/nwrwaves.MMDDYY.log

The LOGS directory will contain the last 30 days of daily log files. This log includes timestamps, products processed and checksums. Files older than 30 days are automatically purged by the program.

/awips/adapt/NWRWAVES/OUTPUT
/awips/adapt/NWRWAVES/OUTPUT/CCCNNNXXX.DDHHMMSS
/awips/adapt/NWRWAVES/OUTPUT/CCCNNNXXX.V###

The OUTPUT directory will contain the last 30 days of Voice Ready files that were sent to CRS. The general naming convention is CCCNNNXXX.DDHHMMSS where XXX is the transmitter ID assigned by the setup program. VTEC products will have the naming convention of CCCNNNXX.V### where ### is MRD derived from the ETN.

/awips/adapt/NWRWAVES/QUEUE
/awips/adapt/NWRWAVES/QUEUE/CCCNNNXXX.YYMMDDHHMMSS.txt

The QUEUE directory will briefly have files in it with the naming convention CCCNNNXXX.YYMMDDHHMMSS.txt. These are files received from the /data/fxa/trigger directory. They are deleted by NWRWAVES as soon as they are processed.

/awips/adapt/NWRWAVES/INPUT
/awips/adapt/NWRWAVES/INPUT/CCCNNNXXX.YYMMDDHHMMSS.txt

The INPUT directory will contain the 30 days of products that were sent to NWRWAVES for processing. The general naming convention is CCCNNNXXX.YYMMDDHHMMSS.txt.

/awips/adapt/NWRWAVES/ERROR
/awips/adapt/NWRWAVES/ERROR/fatalerror_YYMMDDHHMMSS.txt
/awips/adapt/NWRWAVES/ERROR/CCCNNNXXX.YYMMDDHHMMSS.txt

The ERROR directory will contain program stack trace dumps captured when NWRWAVES terminates abnormally. Also (if known) the product that caused

NWRWAVES to crash will be moved into the ERROR directory for additional troubleshooting assistance.

/awips/adapt/NWRWAVES/SUMMARY
/awips/adapt/NWRWAVES/SUMMARY/CCCNNNXXX

The SUMMARY directory will contain warning summary message output. The naming convention is CCCNNNXX where XXX is the transmitter ID assigned by the setup program.

/awips/adapt/NWRWAVES/TEST
/awips/adapt/NWRWAVES/TEST/CCCNNNXXX.DDHHMMSS
/awips/adapt/NWRWAVES/TEST/CCCNNNXXX.V###

/awips/adapt/NWRWAVES/BACKUP

The BACKUP directory contains saved off versions of the sites configuration (cfg) files. This allows a site to revert back to a previous know working state.

```
SV.W,NEW,0250,250,KSC087,1128248100,1128244200,1128248100,Y,A
```

Sample VTEC_Summary.txt file

```
Oct 12 00:25:28 GMT -- Current Checksum 2641289004 123870 nwrwaves.tcl
Oct 12 00:25:28 GMT -- Processing OMANOWOAX...
Oct 12 00:25:28 GMT -- ** OMANOWOAX Detected in NONVTECMRD.txt -- MRD Usage = NO
**
Oct 12 00:25:28 GMT -- ERROR: No UGC matches found on any transmitter. Exiting.
Oct 12 00:25:29 GMT -- Create Summary Message: No active summary message table
found.
Oct 12 00:25:29 GMT -- NWRWAVES terminated successfully.
Oct 12 00:30:57 GMT -- Current Checksum 2641289004 123870 nwrwaves.tcl
Oct 12 00:30:57 GMT -- Processing TOPZFPNWR...
Oct 12 00:30:59 GMT -- ./OUTPUT/TOPZFPCNK.1_12003059 successfully sent to pending
directory.
Oct 12 00:31:02 GMT -- ./OUTPUT/TOPZFPBLR.2_12003102 successfully sent to pending
directory.
Oct 12 00:31:06 GMT -- ./OUTPUT/TOPZFPABI.3_12003106 successfully sent to pending
directory.
Oct 12 00:31:08 GMT -- ./OUTPUT/TOPZFPTOP.4_12003108 successfully sent to pending
directory.
Oct 12 00:31:10 GMT -- ./OUTPUT/TOPZFPHLS.5_12003110 successfully sent to pending
directory.
Oct 12 00:31:10 GMT -- Create Summary Message: No active summary message table
found.
Oct 12 00:31:10 GMT -- NWRWAVES terminated successfully.
Oct 12 00:34:56 GMT -- Current Checksum 2641289004 123870 nwrwaves.tcl
Oct 12 00:34:56 GMT -- Processing TOPHWOTOP...
Oct 12 00:34:56 GMT -- SETTING: Using default duration of 360 minutes in lieu of
UGC expiration time.
Oct 12 00:34:56 GMT -- ** TOPHWOTOP Detected in NONVTECMRD.txt -- MRD Usage = NO
**
Oct 12 00:34:59 GMT -- ./OUTPUT/TOPHWOCNK.1_12003458 successfully sent to CRS.
Oct 12 00:35:08 GMT -- ./OUTPUT/TOPHWOTOP.1_12003508 successfully sent to CRS.
Oct 12 00:35:11 GMT -- ./OUTPUT/TOPHWOABI.1_12003511 successfully sent to CRS.
Oct 12 00:35:15 GMT -- ./OUTPUT/TOPHWOBLR.1_12003515 successfully sent to CRS.
Oct 12 00:35:18 GMT -- ./OUTPUT/TOPHWOHLS.1_12003518 successfully sent to CRS.
Oct 12 00:35:18 GMT -- Create Summary Message: No active summary message table
found.
Oct 12 00:35:18 GMT -- NWRWAVES terminated successfully.
Oct 12 00:51:11 GMT -- Current Checksum 2641289004 123870 nwrwaves.tcl
Oct 12 00:51:12 GMT -- Processing OMANOWGID...
Oct 12 00:51:12 GMT -- ** OMANOWGID Detected in NONVTECMRD.txt -- MRD Usage = NO
**
Oct 12 00:51:14 GMT -- ./OUTPUT/TOPNOWCNK.1_12005113 successfully sent to CRS.
Oct 12 00:51:14 GMT -- Create Summary Message: No active summary message table
found.
Oct 12 00:51:14 GMT -- NWRWAVES terminated successfully.
Oct 12 00:51:21 GMT -- Another NWRWAVES process is running...waiting 5 sec
Oct 12 00:51:29 GMT -- Current Checksum 2641289004 123870 nwrwaves.tcl
Oct 12 00:51:29 GMT -- Processing OMANOWGID...
Oct 12 00:51:29 GMT -- ** OMANOWGID Detected in NONVTECMRD.txt -- MRD Usage = NO
**
Oct 12 00:51:31 GMT -- ./OUTPUT/TOPNOWCNK.1_12005131 successfully sent to CRS.
Oct 12 00:51:31 GMT -- Create Summary Message: No active summary message table
found.
Oct 12 00:51:31 GMT -- NWRWAVES terminated successfully.
…
```

Sample nwrwaves.MMDDYY.log file

Sample YYMMDDHHMMSSdebug.txt File

```
Product Header:

KSC087-021015-
/O.NEW.KTOP.SV.W.0250.051002T0910Z-051002T1015Z/

BULLETIN - EAS ACTIVATION REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE TOPEKA KS
410 AM CDT SUN OCT 2 2005

Section 1 expiration: 021015
Section 1 UGC string: KSC087
Section 1: VTEC line 1
VTEC STATUS: O
VTEC Action: NEW
VTEC WFO: KTOP
VTEC Phenom: SV
VTEC Significance: W
VTEC ETN: 0250
VTEC Begin Time/Date: 0510020910
VTEC Begin Time/Date - Clock Seconds: 1128244200
VTEC End Time/Date: 0510021015
VTEC End Time/Date - Clock Seconds: 1128248100
Segment Text:


THE NATIONAL WEATHER SERVICE IN TOPEKA HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  JEFFERSON COUNTY IN NORTHEAST KANSAS

* UNTIL 515 AM CDT

* AT 406 AM CDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
  SEVERE THUNDERSTORM CAPABLE OF PRODUCING NICKEL SIZE HAIL...AND
  DAMAGING WINDS IN EXCESS OF 60 MPH.  THIS STORM WAS LOCATED 8 MILES
  WEST OF OZAWKIE...OR ABOUT 11 MILES NORTHEAST OF TOPEKA...MOVING
  EAST AT 25 MPH.

* LOCATIONS IMPACTED INCLUDE...
  PERRY LAKE...
  OZAWKIE...
  VALLEY FALLS...
  OSKALOOSA...
  WINCHESTER...
  MCLOUTH...

LARGE HAIL...VERY HEAVY RAIN AND DAMAGING WINDS ARE LIKELY WITH THIS
STORM. FOR YOUR SAFETY...TAKE COVER INSIDE A BUILDING.

SEVERE THUNDERSTORMS PRODUCE DAMAGING WINDS IN EXCESS OF 60 MPH...
DESTRUCTIVE HAIL...DEADLY LIGHTNING AND VERY HEAVY RAIN. FOR YOUR
SAFETY MOVE TO AN INTERIOR ROOM ON THE LOWEST FLOOR OR A BASEMENT AND
AVOID WINDOWS.

STAY TUNED TO WEATHER RADIO OR LOCAL MEDIA OUTLETS FOR THE LATEST
SEVERE WEATHER INFORMATION.



********************************************************************************

NUMBER OF SEGMENTS: 1


****** SEGMENT 1 *******
Issue time: ISSUED AT 04:11 AM CDT Sunday.
CRS Header Expiration from segment|0510021015|
```

Sample Product Output

```
_aT_ENGTOPSVRTOP051002091105100209l1        250CD IAKSC087c0510021015


THE NATIONAL WEATHER SERVICE IN TOPEKA HAS ISSUED A

 SEVERE THUNDERSTORM WARNING FOR,
  JEFFERSON COUNTY,


 UNTIL 5:15 AM, AT 4:06 AM, NATIONAL WEATHER SERVICE DOPPLER RADAR, INDICATED A
  SEVERE THUNDERSTORM CAPABLE OF PRODUCING NICKEL SIZE HAIL, AND
  DAMAGING WINDS IN EXCESS OF 60 MILES PER HOUR.  THIS STORM WAS LOCATED 8 MILES
  WEST OF OZAWKIE, OR ABOUT 11 MILES NORTHEAST OF TOPEKA, MOVING
  EAST AT 25 MILES PER HOUR.

 LOCATIONS IMPACTED INCLUDE,
  PERRY LAKE,
  OZAWKIE,
  VALLEY FALLS,
  OSKALOOSA,
  WINCHESTER,
  MCLOUTH,

LARGE HAIL, VERY HEAVY RAIN AND DAMAGING WINDS ARE LIKELY WITH THIS
STORM. FOR YOUR SAFETY, TAKE COVER INSIDE A BUILDING.

SEVERE THUNDERSTORMS PRODUCE DAMAGING WINDS IN EXCESS OF 60 MILES PER HOUR,
DESTRUCTIVE HAIL, DEADLY LIGHTNING AND VERY HEAVY RAIN. FOR YOUR
SAFETY MOVE TO AN INTERIOR ROOM ON THE LOWEST FLOOR OR A BASEMENT AND
AVOID WINDOWS.

STAY TUNED TO WEATHER RADIO OR LOCAL MEDIA OUTLETS FOR THE LATEST
SEVERE WEATHER INFORMATION.

_b
```

Appendix B: Requirements to replace WWA NWR and CAFÉ applications

Several documents were reviewed to see a candidate list of requirements for a baseline CRS product formatter. This has been referred to as UFOR in the SREC process for AWIPS. Also, a review of CAFÉ scripts was provided by OOS. Requirements were pulled from this documentation. OOS also provided additional needs that this software should provide.

Below is a table that summarizes what can be drawn from these documents as potential requirements. WWA CRS capabilities are not specifically listed, but are included in either the UFOR, CAFÉ or both sections. The Yes/No column indicates whether the prototype software (NWRWAVES) meets the indicated need. Comments provide additional information.

This listing is by no means a complete analysis of CRS formatting requirements. Our task was to provide an update to CAFÉ scripts to account for WWA capabilities. This document can serve as a starting point for discussion.

UFOR Document Requirements	Yes/No	Comments
Configurable by event type – use VTEC when available	Yes	
Configurable lead-in by event type	Yes	
Configurable trailer by event type	Yes	Ability to repeat what, who, where (headline type message)
Tower specific broadcast products	Yes	
Alert the forecaster when a formatter has failed in real time.	Yes	Red Banner Message generated
Ability to recreate or re-run a formatter via a GUI	No	NWRBrowser requirement
Ability to manually run formatter for certain issuances of a product	No	
Blackout periods when product will not be toned/EAS-ed	Yes	
Tone alert product automatically at the end of the black out period	No	NWRBrowser and CRS capability
Ability to not tone/EAS for cancellation and/or continuation statements	Yes	Uses VTEC code
Create summary messages when the number of messages of the same type exceeds the summary threshold	Yes	
Automatically expire the original messages and replace it with a summary message	No	NWRBrowser/CRS requirement. Original products contain additional detail/CTAs/etc…
Create MRD numbers and tracking system for the CRS products	Yes	
Option to automatically send a product to the CRS without user intervention	Yes	Uses NWRBrowser system Send/Pending
Remove/expire a product from the CRS database via a GUI directly on AWIPS	No	NWRBrowser requirement
Alert the forecaster to error messages appearing on the CRS console and recommend ways of solving.	No	NWRBrowser requirement
WBC Processing	Yes	

CAFÉ Document Requirements

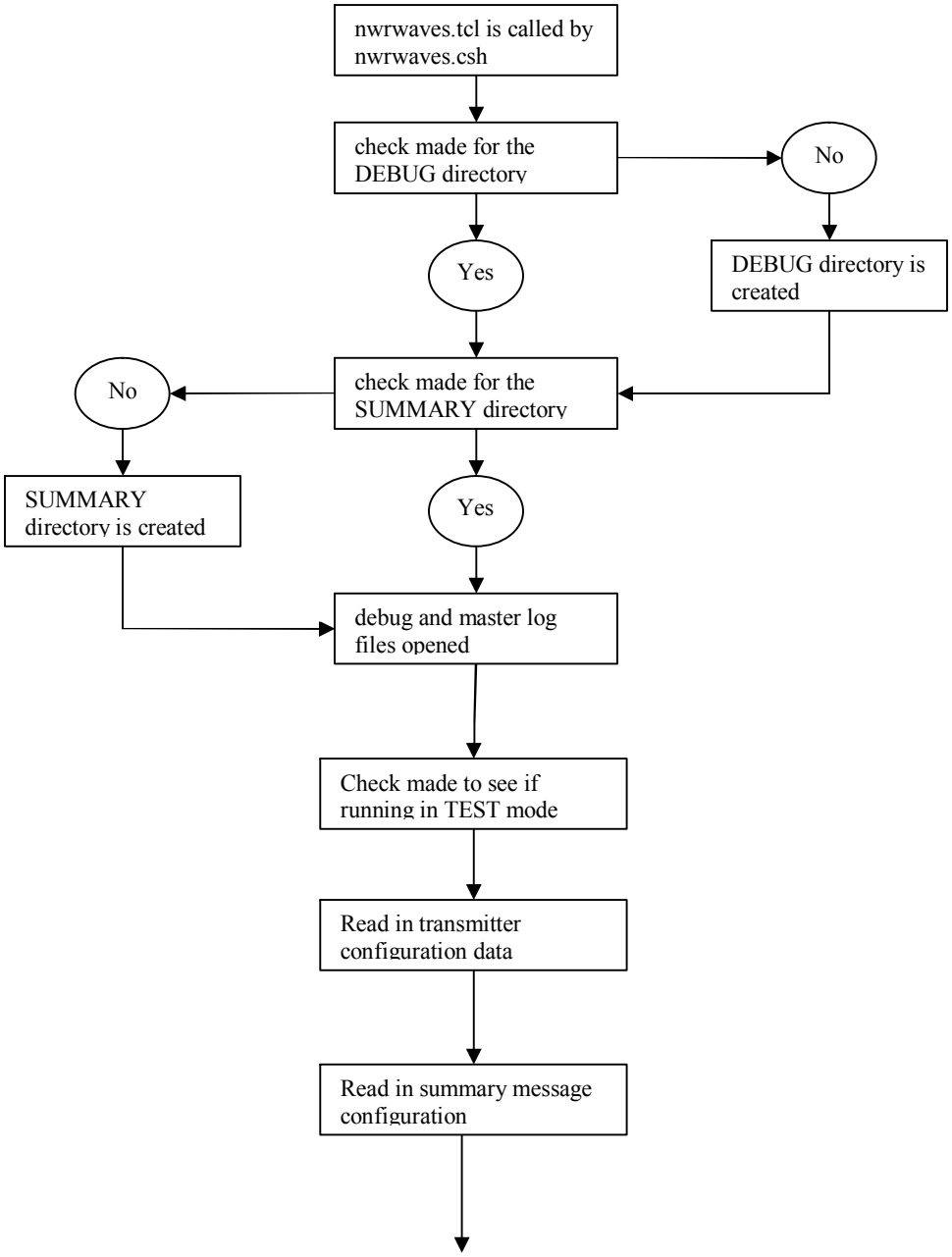
Specific tcl/tk version needed?	No	
Special library files needed?	Yes	Extra library files provided
Compatible with baseline COTs software?	Yes	
Execute manually (or via GUI) as well as by trigger or cron	Yes	Designed to use triggers but can be manually executed
Check for hung processes	Yes	
Word replacement capability	Yes	Uses unique "WordFile.txt" in /bin directory
Utilize NWRBrowser capabilities	Yes	
Create transmitter specific products	Yes	CRS PILs utilize configurable transmitter labels
VTEC code not included in product (stripped)	Yes	
Program documentation	Yes	
One instance of program runs at a time	Yes	
WMO headers stripped	Yes	
CRS header created	Yes	
Use a configuration file to define CRS header by product	Yes	
Configure on per product basis	Yes	Configured by product and VTEC phenomena code
Error reporting about bad configuration setup	Yes	Setup done by GUI – does not allow error inputs
On/Off capability for product	Yes	
Duplicate product checking	Yes	
Help available in setup process	Yes	On-line in Setup GUI
Replace PIL with CRS PIL	Yes	
Expiration override can be specified	Yes	.
Tone on one transmitter and not on others	Yes	Can be handled by CRS configuration since transmitter specific products
Define zones by transmitter	Yes	
Intro (lead-in) capability option	Yes	
Use/don't use headlines option	Yes	
Issued time lead-in option	Yes	
Alarm code options in CRS string (A, N or blank)	Yes	
Interrupt code option	Yes	
Active code option (I, X, A, C)	Yes	
Periodicity option	Yes	
Send to CRS or flat file modes	Yes	Test mode send output to TEST directory
Dual time zones properly formatted	Yes	Still Needs testing
$$ cutoff of text	Yes	
&& use/don't use option	Yes	
Debug logs	Yes	
Areas to LAC conversion	Yes	
Web address handling	Yes	See examples in WordFile.txt in /bin directory
Proper handling of range of zones (use of >)	Yes	
Multiple blanks removed	Yes	Formatter removed extraneous blanks and adds word wrap to improve

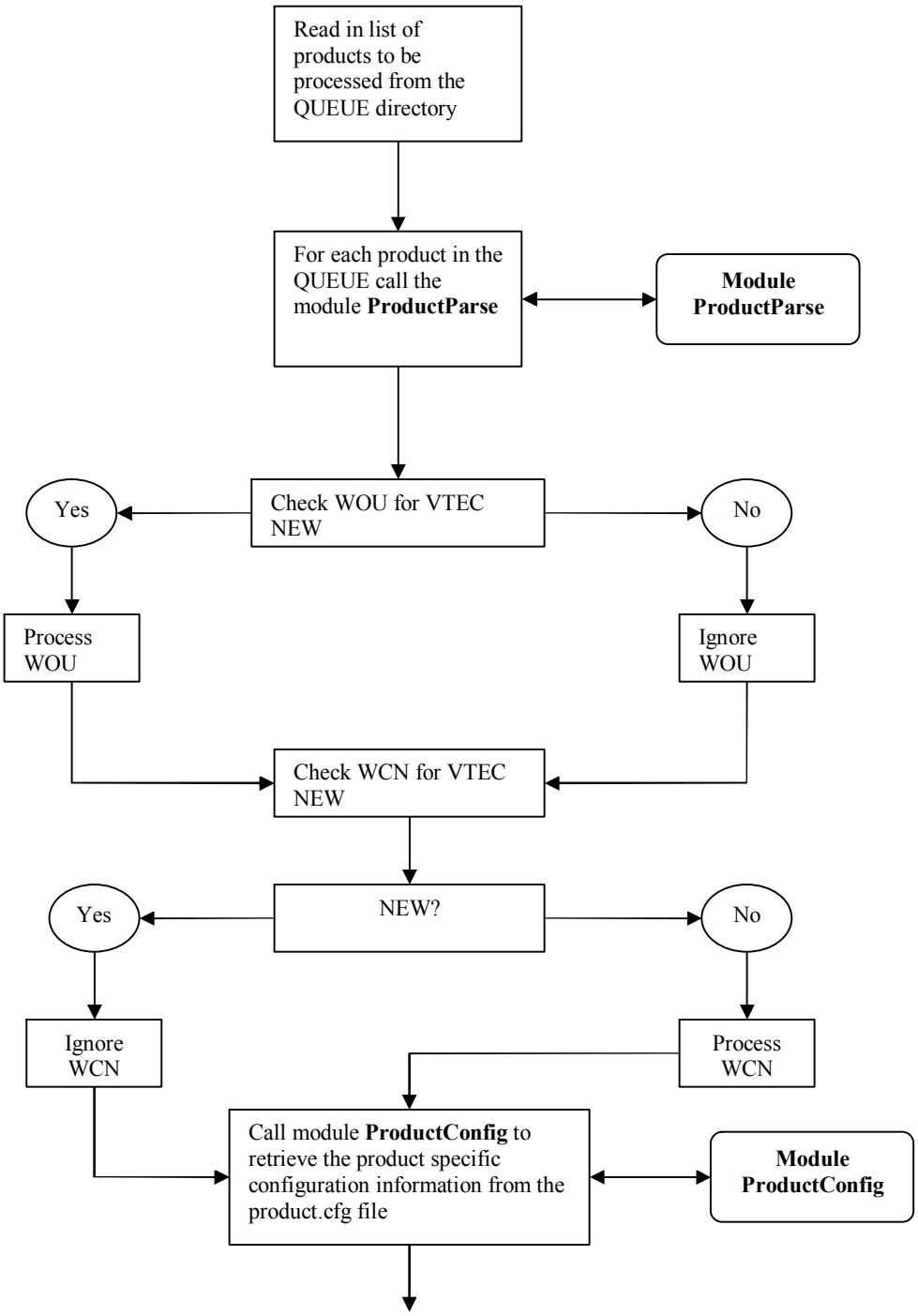
		browser readability
Word replace file – convert or use CAFÉ file	Yes	New "WordFile.txt" file
FIPS63.in and ZONE.in used	Yes	Updated files provided (counties.ini and zones.ini)
No UGC – specify transmitter to play on option	No	Defaults to all transmitters
Spanish language (T_SPA) in CRS heading capability	Yes	
Flash flood watch – alarm based on text option	No	Uses VTEC Action Code "NEW"
Zone and county substitution	Yes	
GLF – synopsis and sections selection option	Yes	
HLS – sub-headline option (looks for word surrounded by … (…TIDES…)	Yes	
Manual product capability – pops a tcl window for CRS processing choices	No	
CRS tower ids defined with area codes (UGC/UGZ)	Yes	
Format tabular data	No	For what products?
TCP – lat/lon defined tone box option	Yes	
Travelers forecast capability (uses CCF)	No	See TVL program by Mike Hudson/Evan Bookbinder

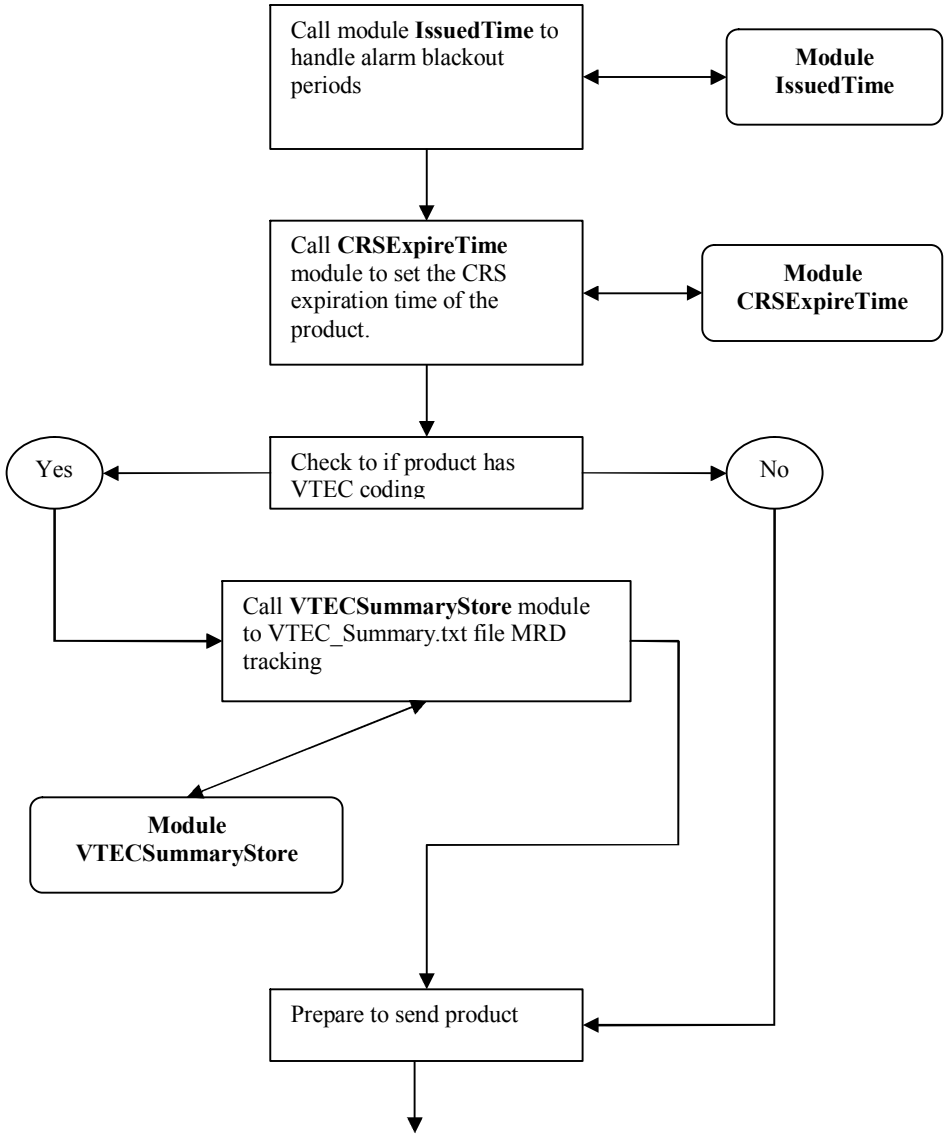
Additional Items

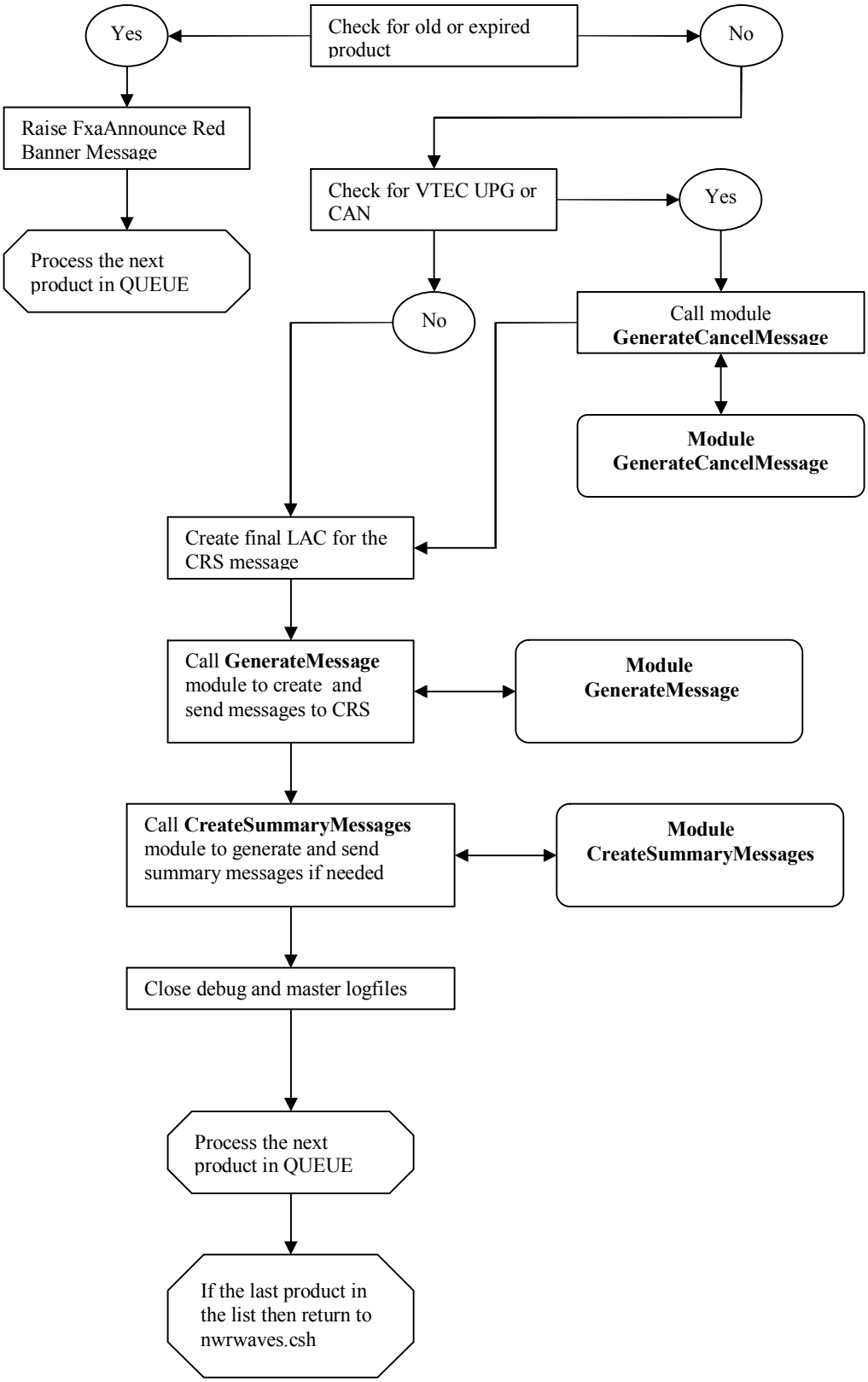
Checksumming – logged once on beginning processing	Yes	
Debug file tracing major processing points	Yes	
Retain full copy of resulting product	Yes	
On-line documentation to assist installation – Detailed "How To" Guide	Yes	
Logging – GMT stamped to the second line for each in//out/ erred, etc. product – min of one month storage	Yes	
Never send VTEC data to CRS – use for MRD generation, and identifying test products	Yes	
Blackout Period – time restrict SAME option	Yes	
Short "Getting Started" guide on how to set up NPG.	Yes	
Converting of CAFÉ config files or examples	No	Setup GUI program provides reasonable defaults that are easily customizable.
Use the native word replacement file used by CAFÉ (WordFile.txt) – or conversion utility	Yes	
Alarming capabilities configurable across all products with specialized interrupt/alarm formatting for products such as Non Weather Emergency Message, TCP and FFA.	Yes	No specialized capabilities at this time
Tabular data – handle both horizontal and vertical tables	No	
Automatic test time – need ability to automate testing by providing configurable time return – configure to actual GMT time return in the field and test a configurable time return	No	Need more specifics concerning how this should work.

Appendix C: NWRWAVES Module Flow Diagram

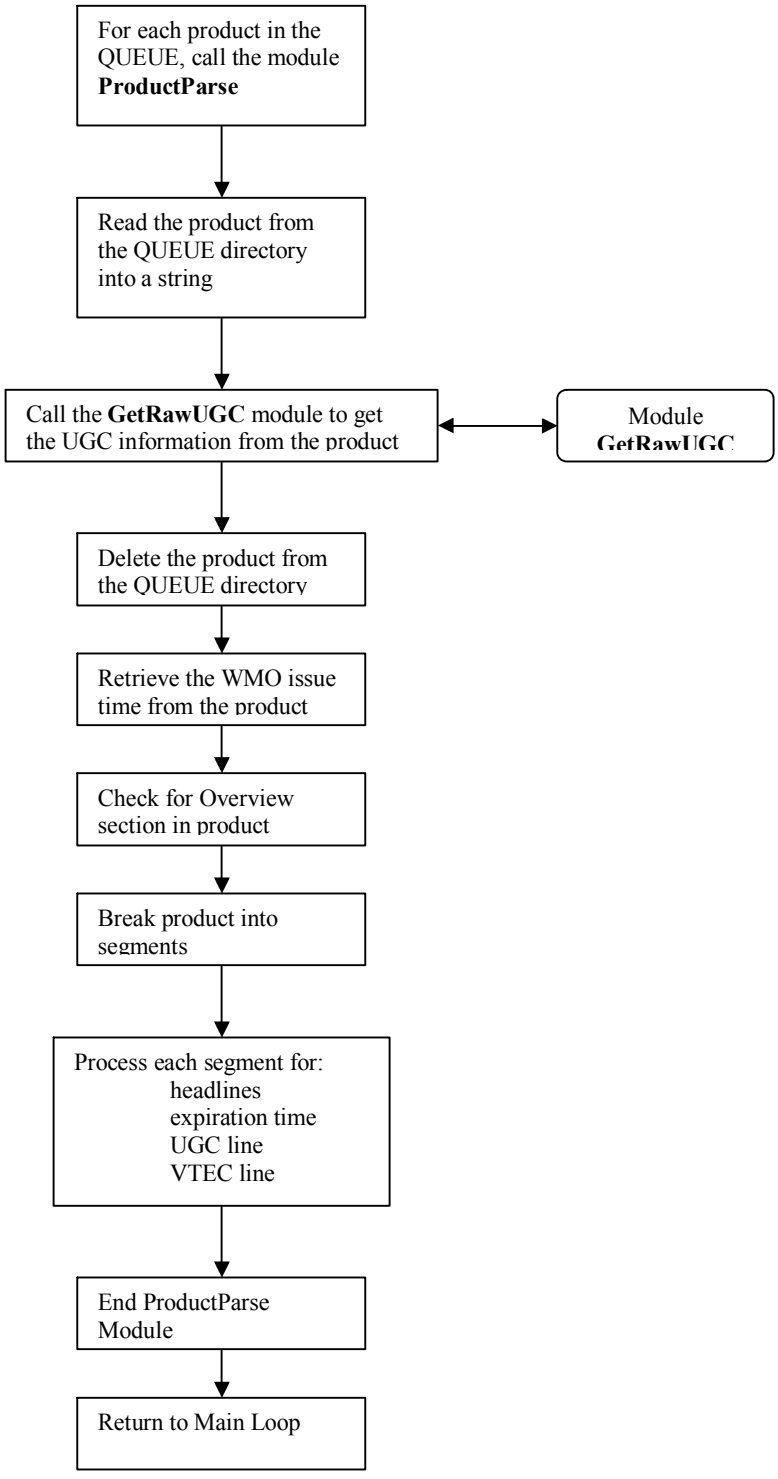



Read in list of products to be processed from the QUEUE directory
For each product in the QUEUE call the module **ProductParse**
Module ProductParse
Check WOU for VTEC NEW
Yes
No
Process WOU
Ignore WOU
Check WCN for VTEC NEW
NEW?
Yes
No
Ignore WCN
Process WCN
Call module **ProductConfig** to retrieve the product specific configuration information from the product.cfg file
Module ProductConfig

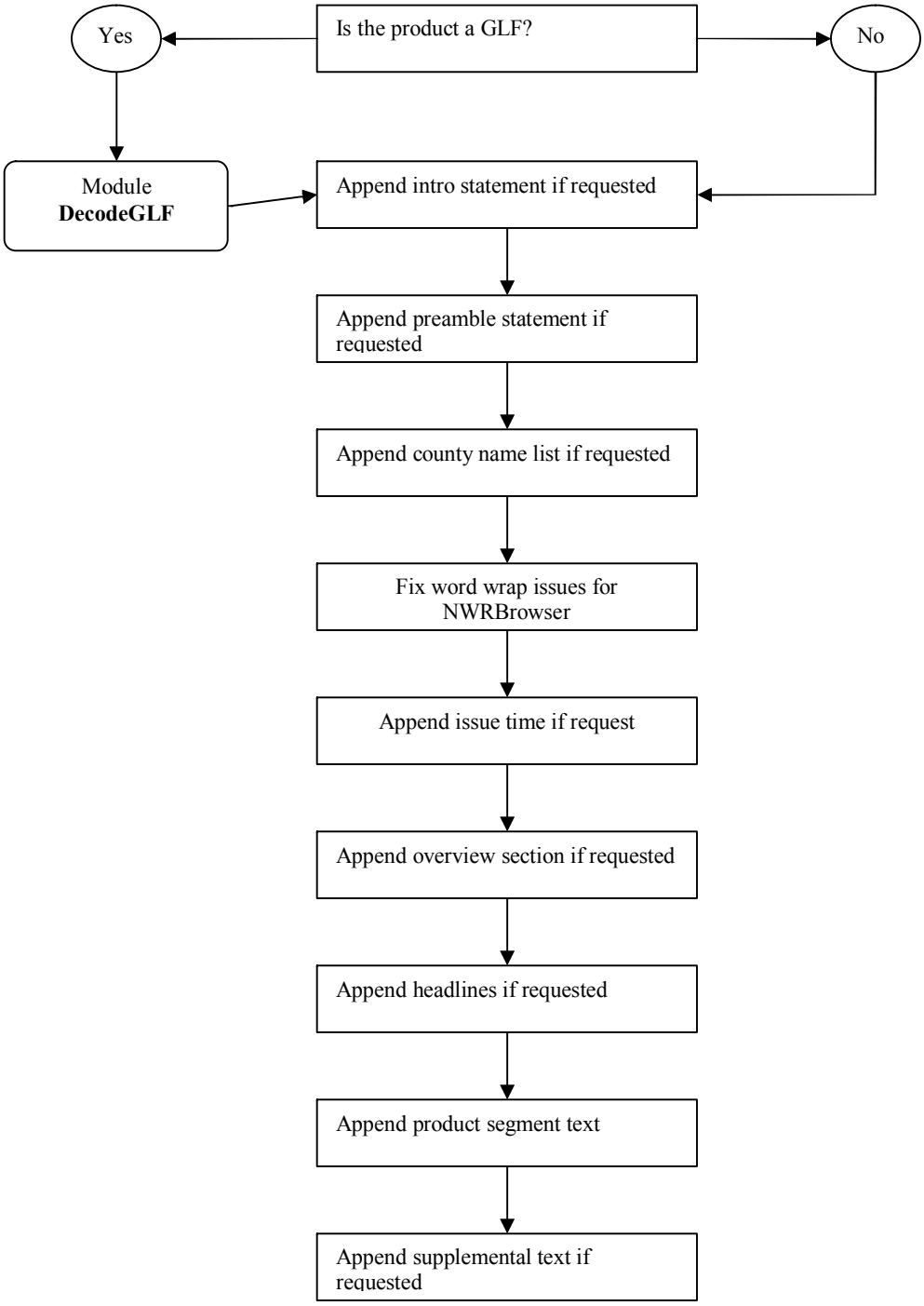

Call module **IssuedTime** to handle alarm blackout periods
Module IssuedTime
Call **CRSExpireTime** module to set the CRS expiration time of the product.
Module CRSExpireTime
Check to if product has VTEC coding
Yes
No
Call **VTECSummaryStore** module to VTEC_Summary.txt file MRD tracking
Module VTECSummaryStore
Prepare to send product

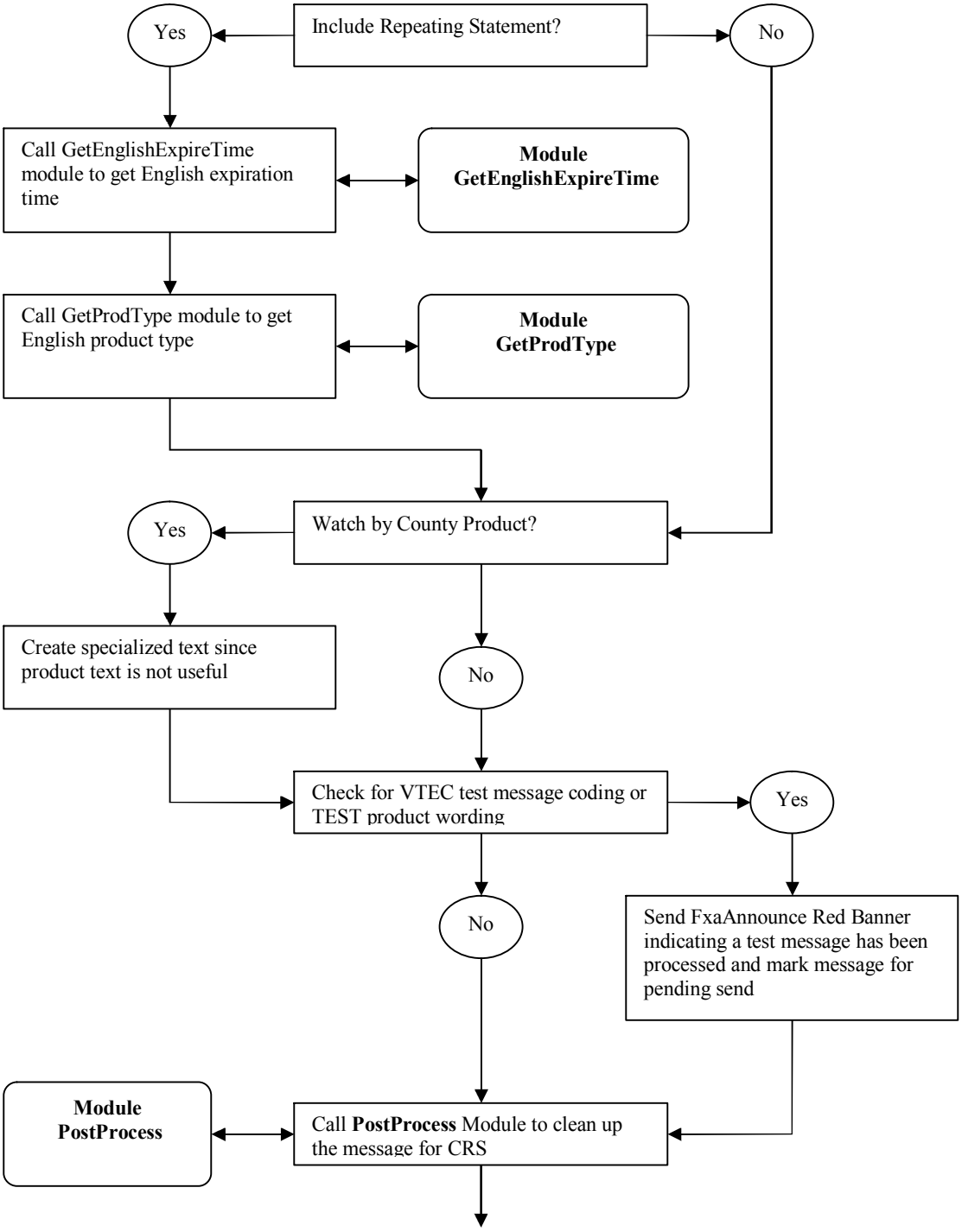

Check for old or expired product
Yes
No
Raise FxaAnnounce Red Banner Message
Process the next product in QUEUE
Check for VTEC UPG or CAN
Yes
No
Call module **GenerateCancelMessage**
Module GenerateCancelMessage
Create final LAC for the CRS message
Call **GenerateMessage** module to create and send messages to CRS
Module GenerateMessage
Call **CreateSummaryMessages** module to generate and send summary messages if needed
Module CreateSummaryMessages
Close debug and master logfiles
Process the next product in QUEUE
If the last product in the list then return to nwrwaves.csh

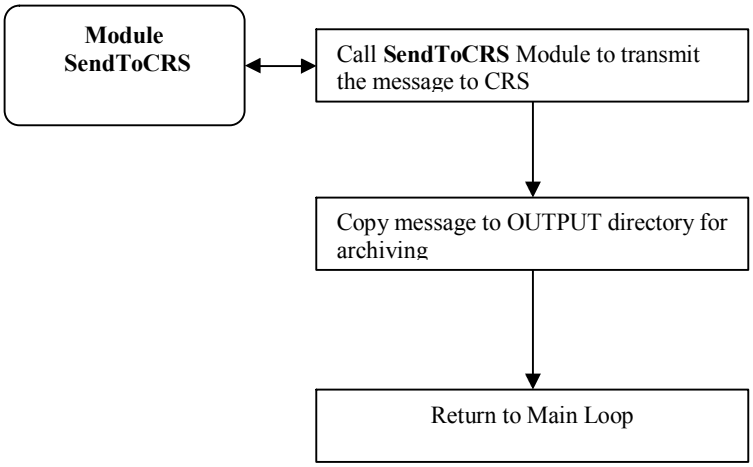
Flow Diagram for Module Product Parse



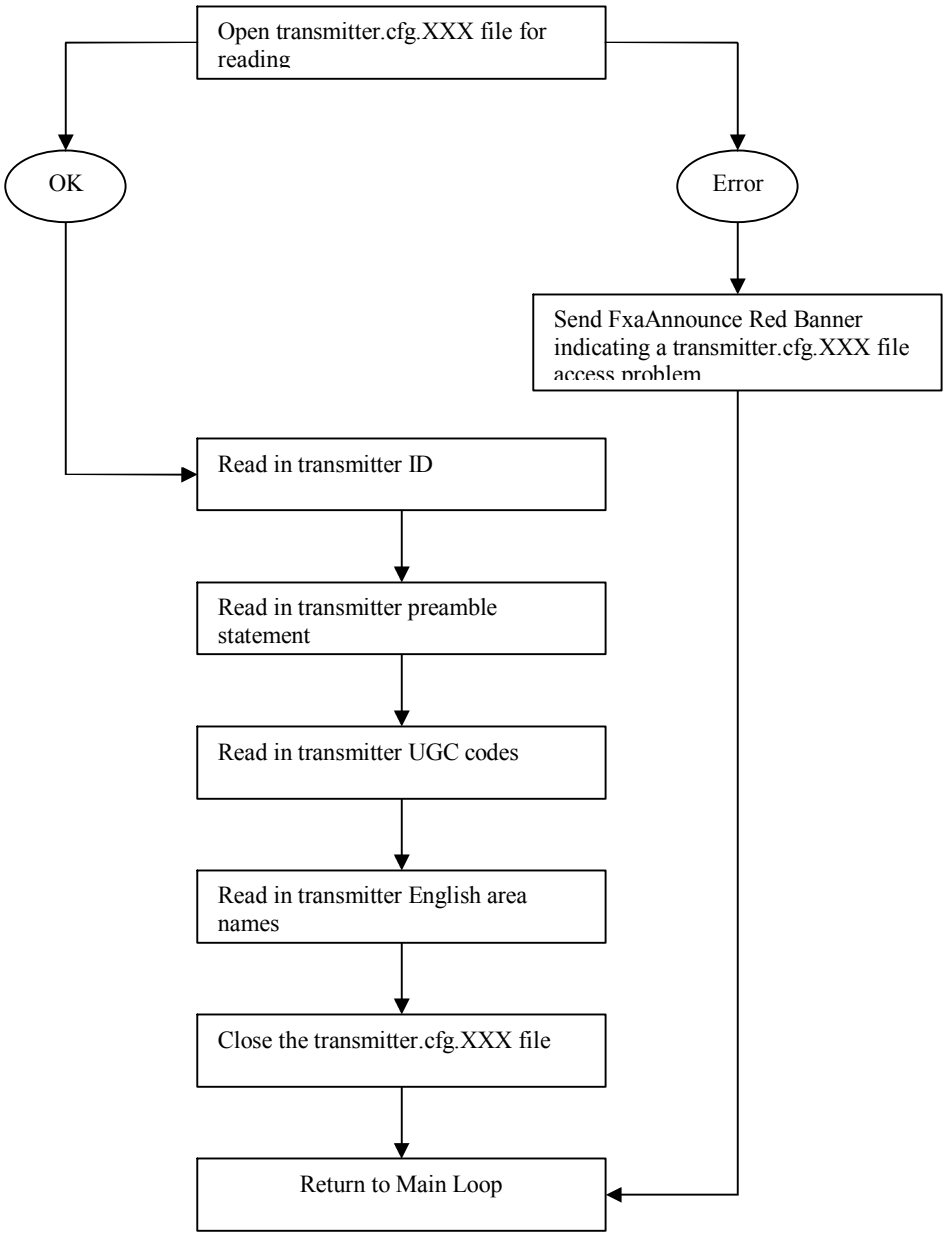
Flow Diagram for Module GenerateMessage



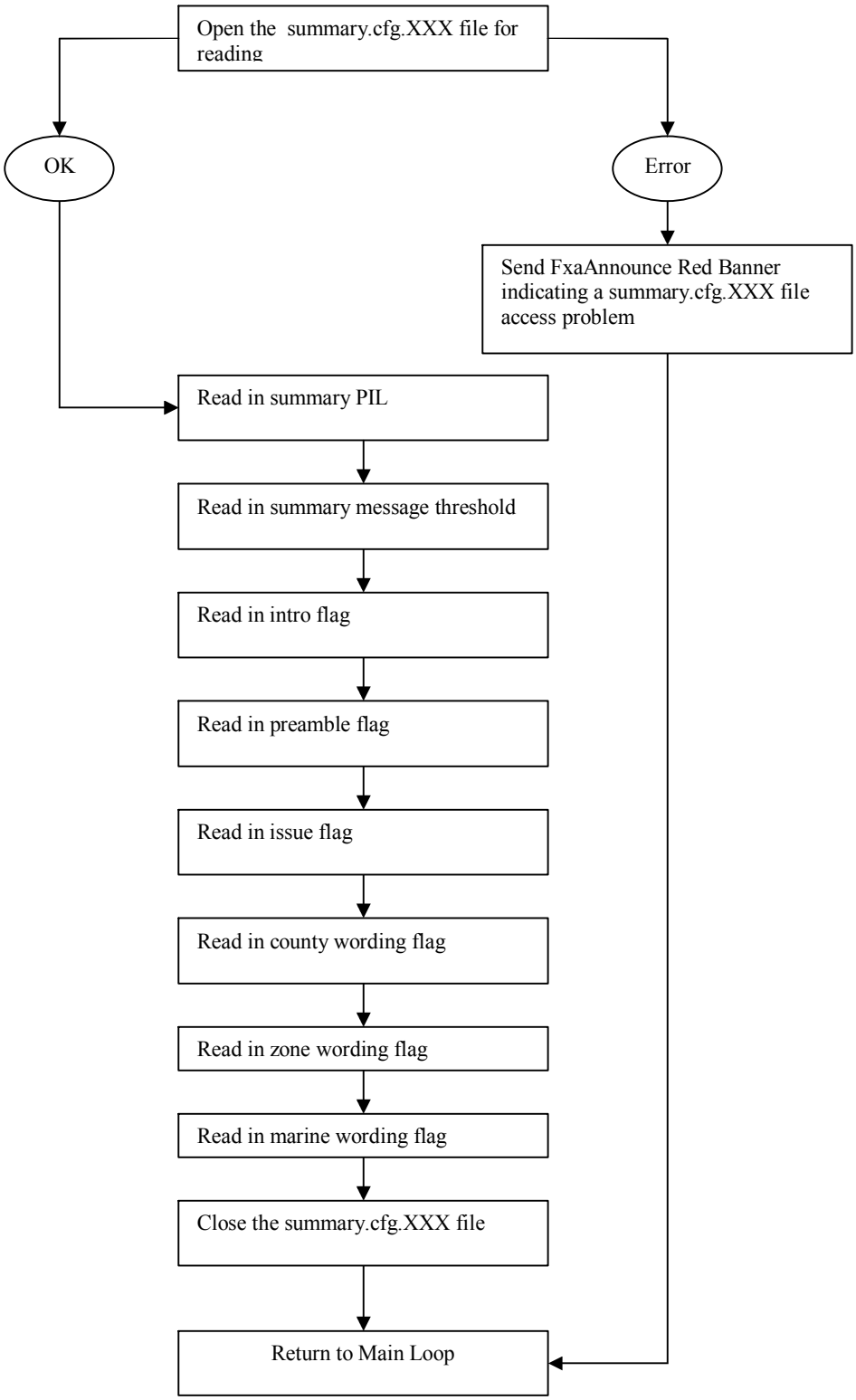

Include Repeating Statement?
Yes
No
Call GetEnglishExpireTime module to get English expiration time
Module GetEnglishExpireTime
Call GetProdType module to get English product type
Module GetProdType
Watch by County Product?
Yes
Create specialized text since product text is not useful
No
Check for VTEC test message coding or TEST product wording
Yes
No
Send FxaAnnounce Red Banner indicating a test message has been processed and mark message for pending send
Module PostProcess
Call PostProcess Module to clean up the message for CRS


Module
SendToCRS
Call SendToCRS Module to transmit the message to CRS
Copy message to OUTPUT directory for archiving
Return to Main Loop

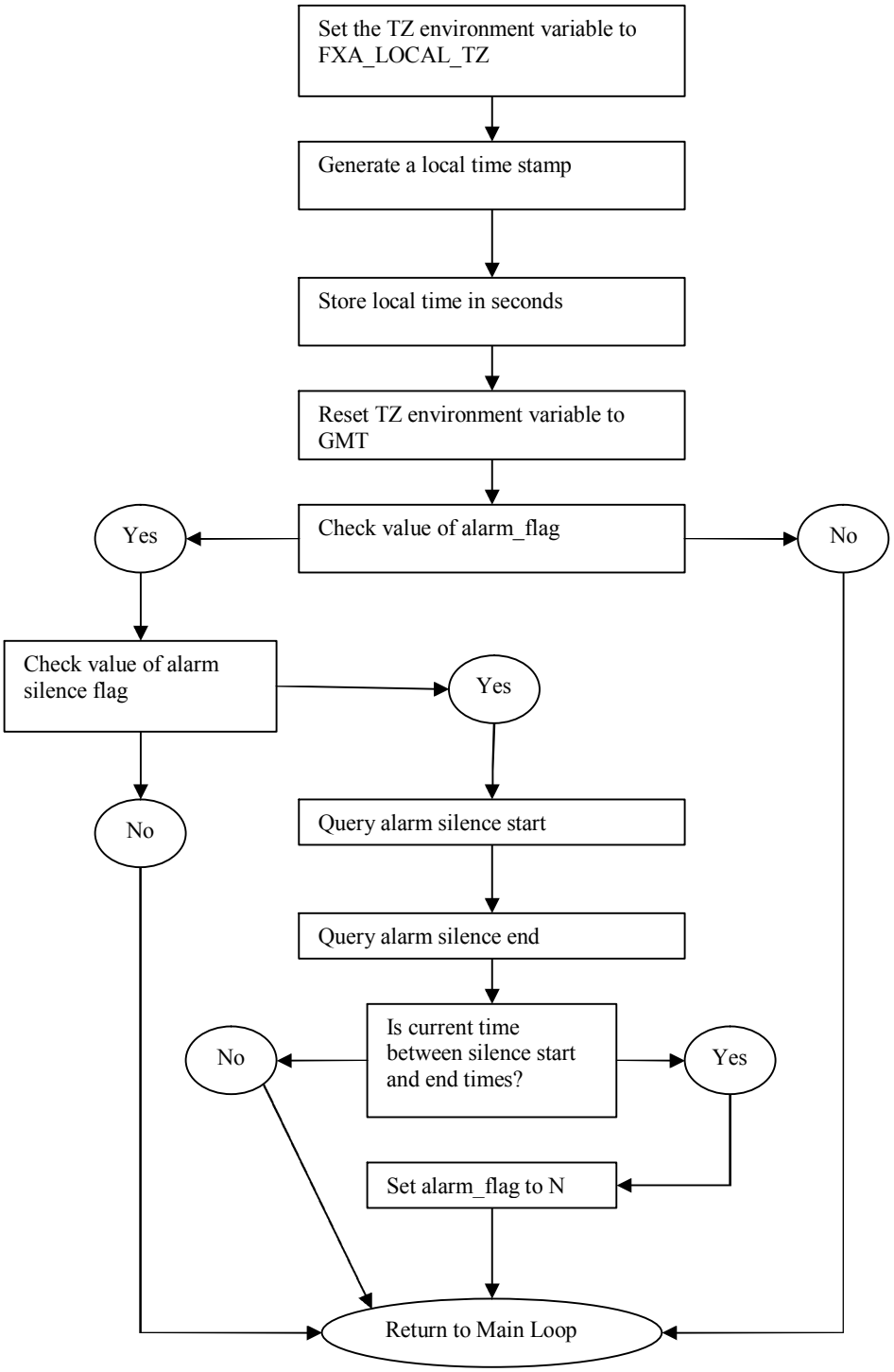
Flow Diagram for Module TransmitterConfig



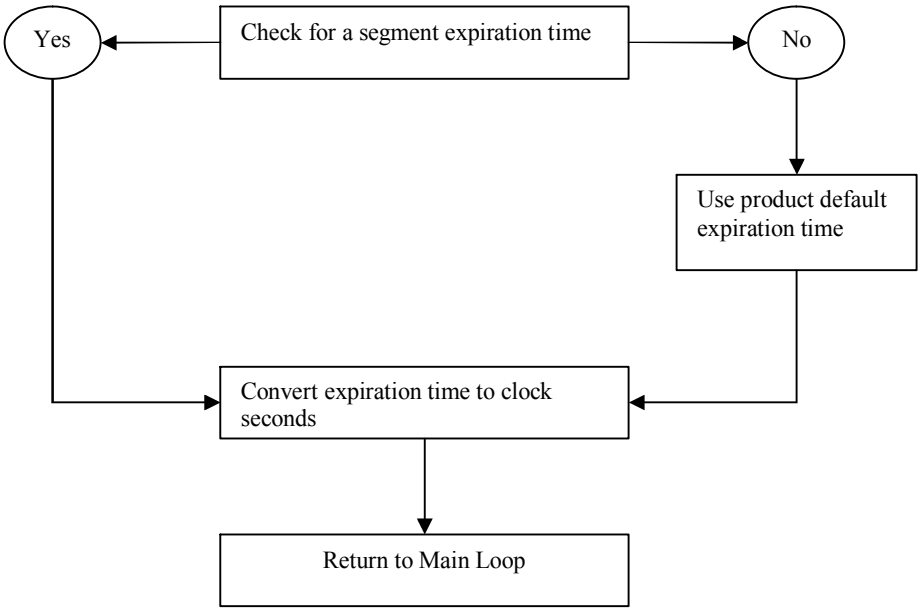
Flow Diagram for Module SummaryConfig



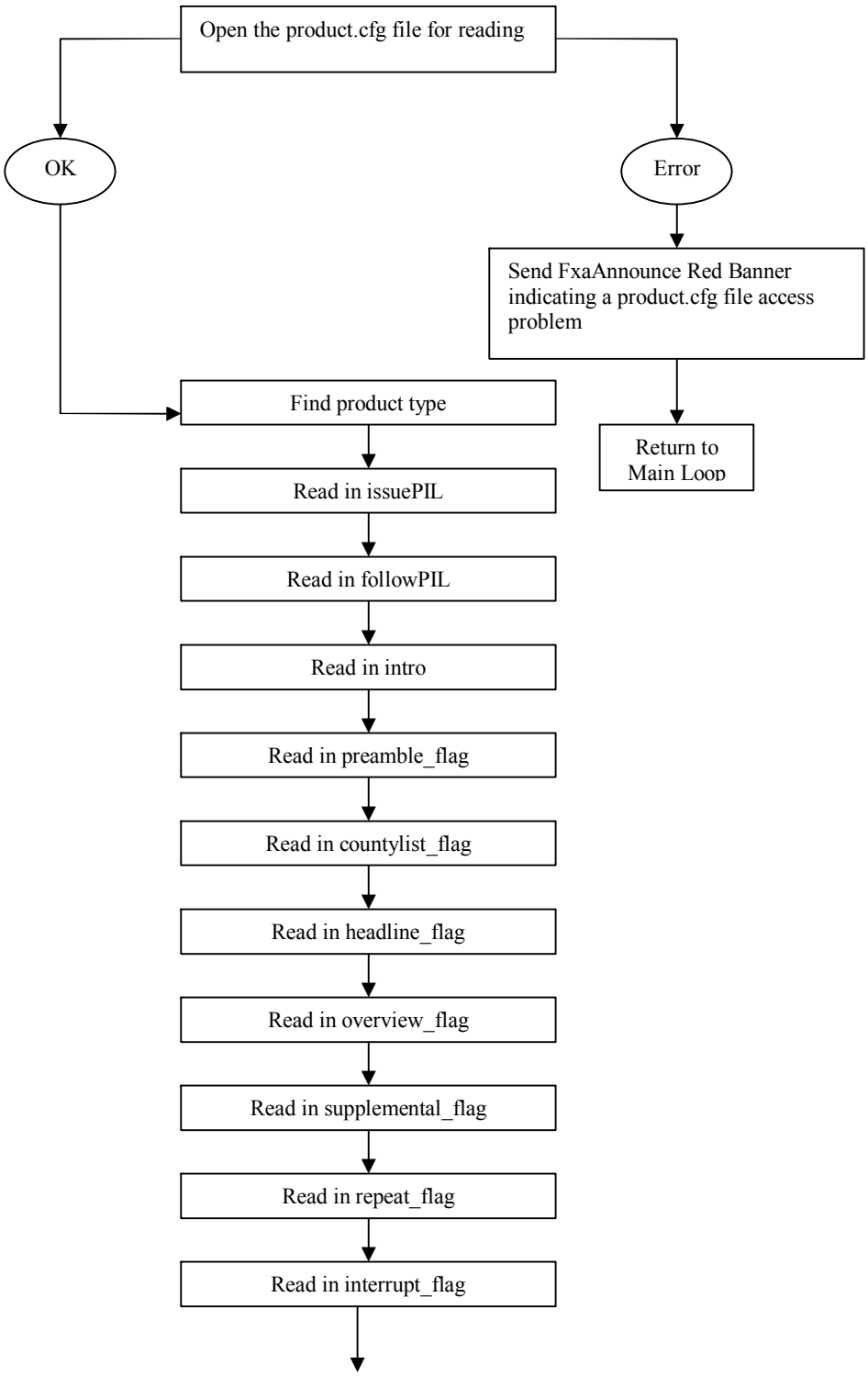
Flow Diagram for Module IssuedTime

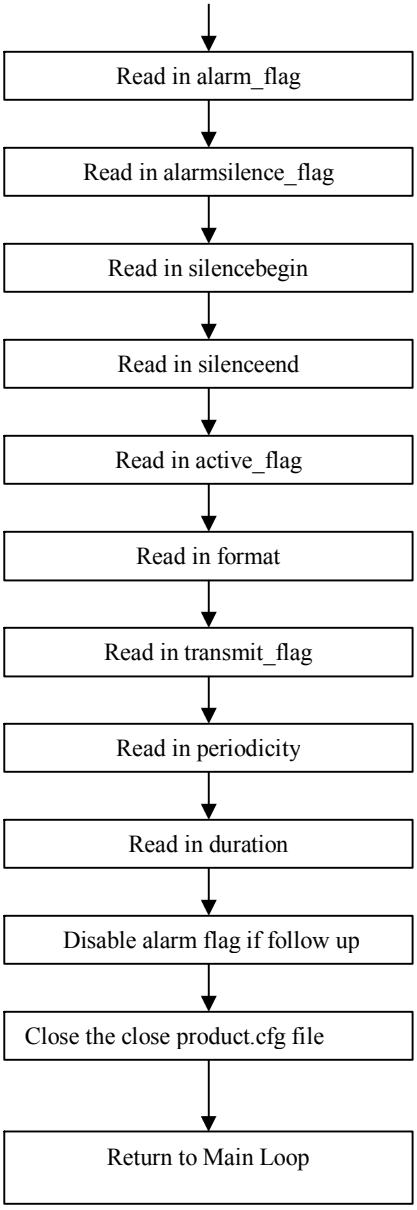


Flow Diagram for Module CRSExpireTime

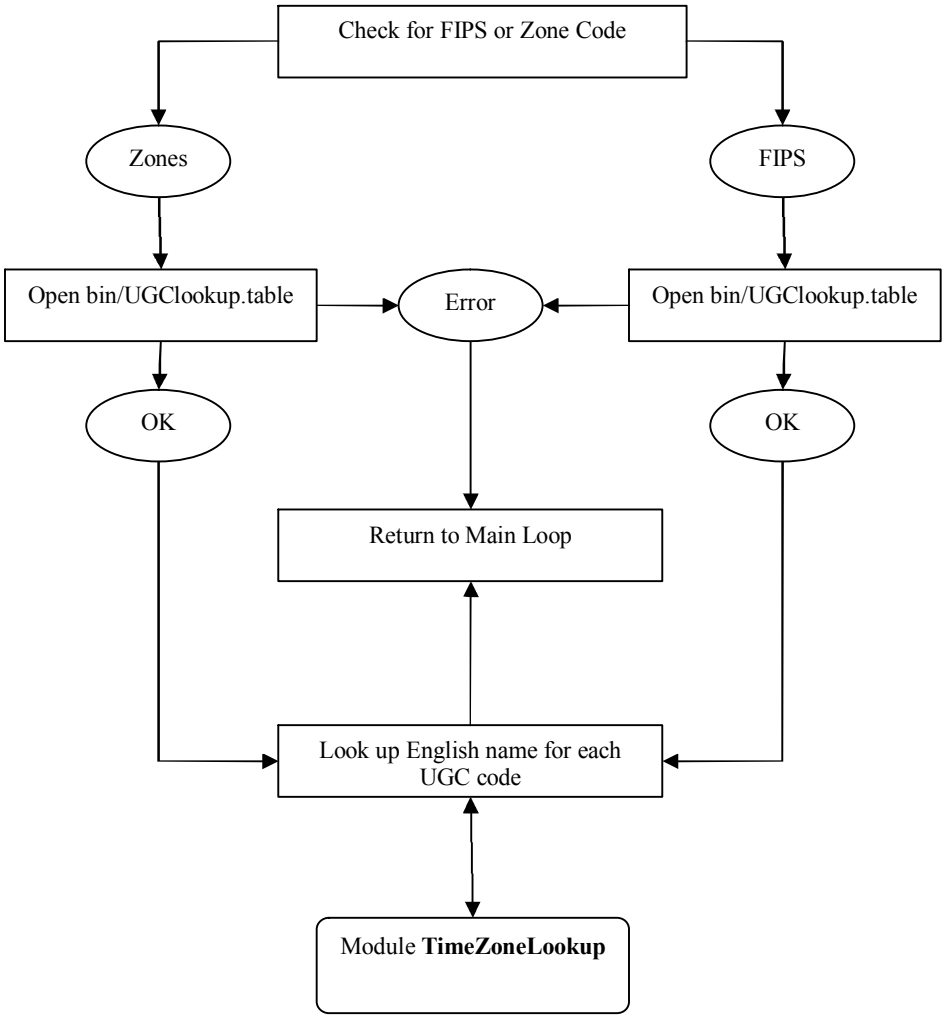


Flow Diagram for Module ProductConfig

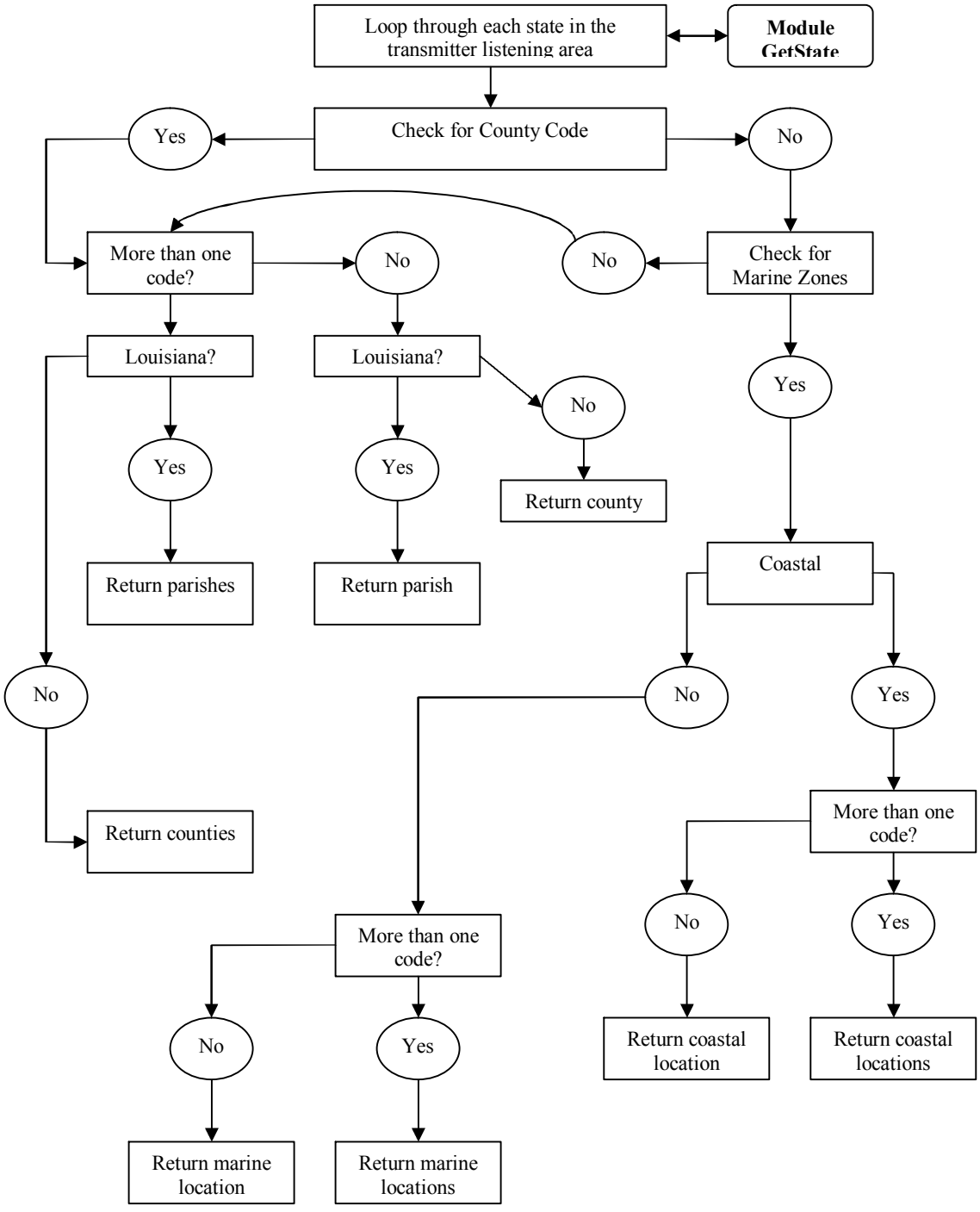



Read in alarm_flag
Read in alarmsilence_flag
Read in silencebegin
Read in silenceend
Read in active_flag
Read in format
Read in transmit_flag
Read in periodicity
Read in duration
Disable alarm flag if follow up
Close the close product.cfg file
Return to Main Loop

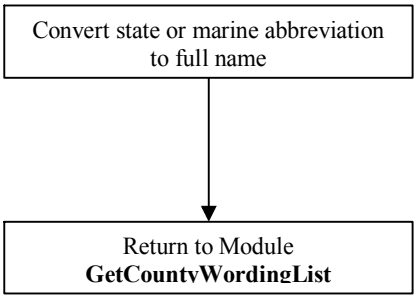
Flow Diagram for Module GetCountyZoneList



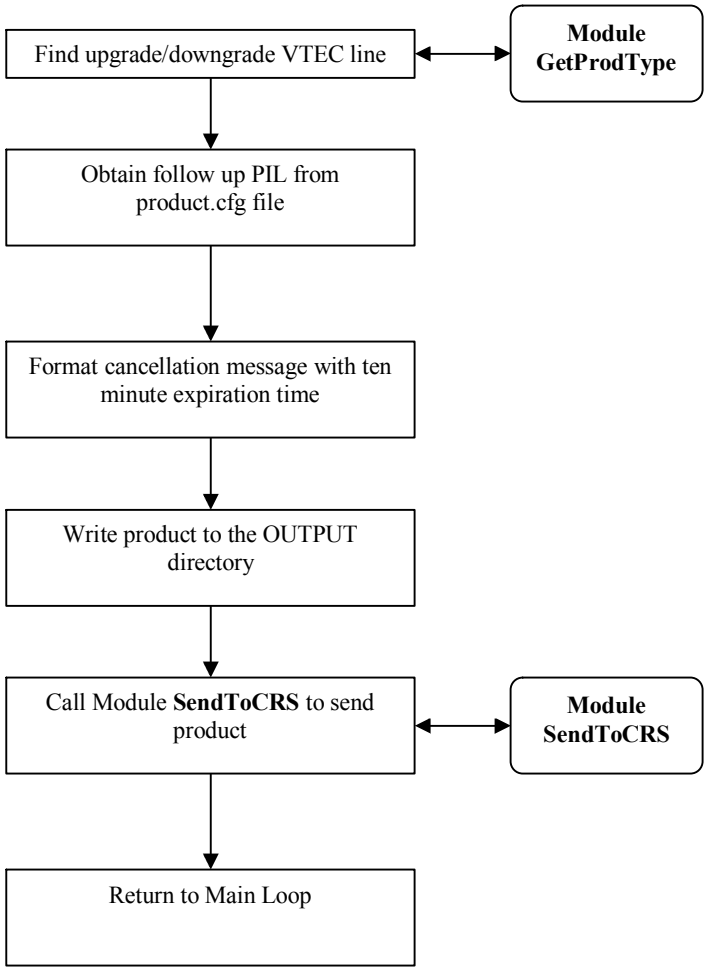
Flow Diagram for Module GetCountyListWording



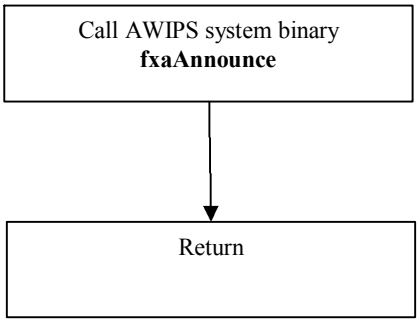
Flow Diagram for Module GetState



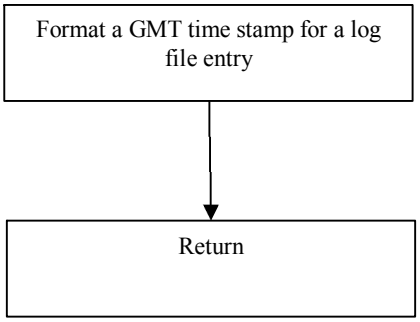
Flow Diagram for Module GenerateCancelMessage



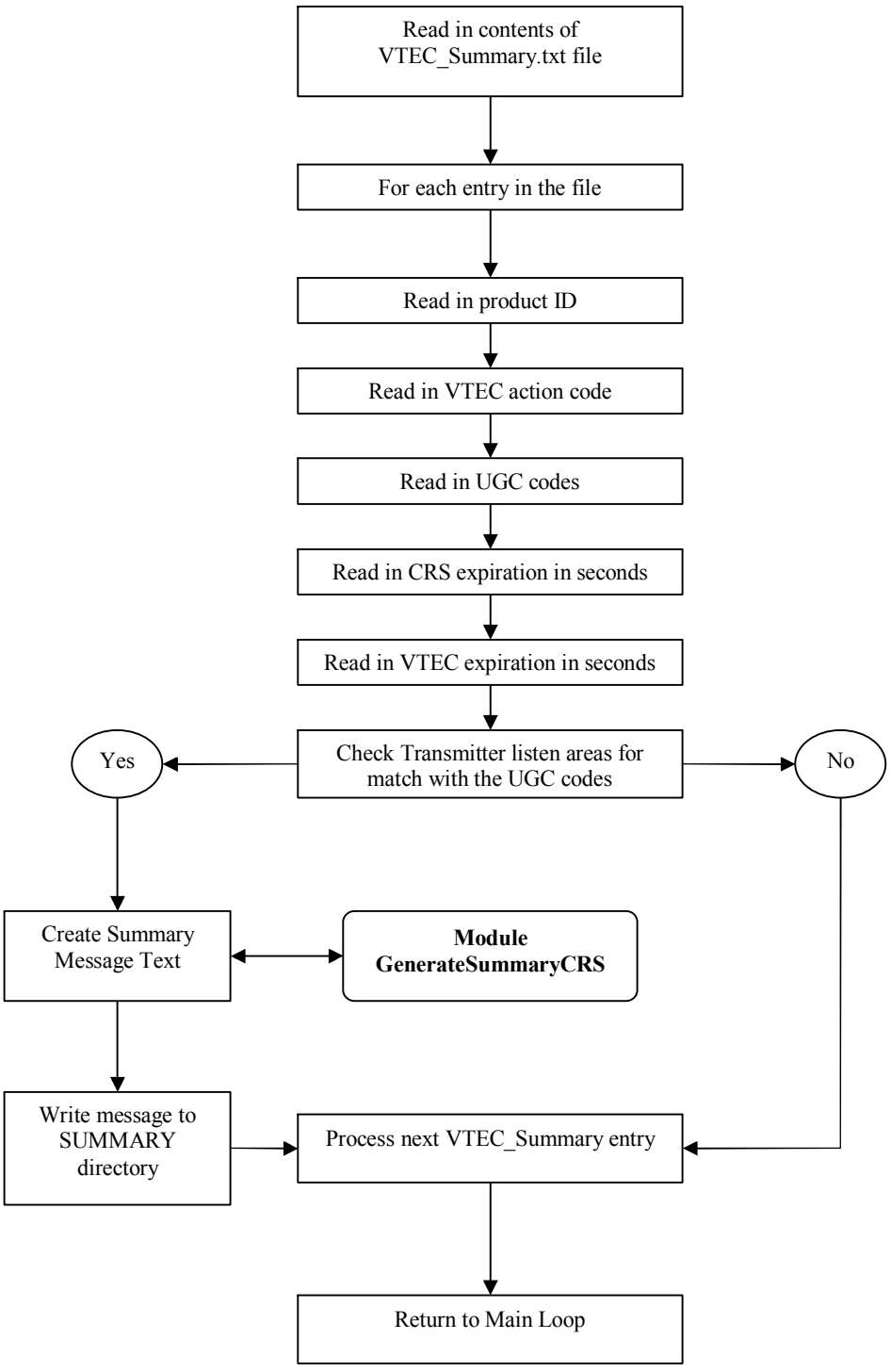
Flow Diagram for Module FxaAnnounce



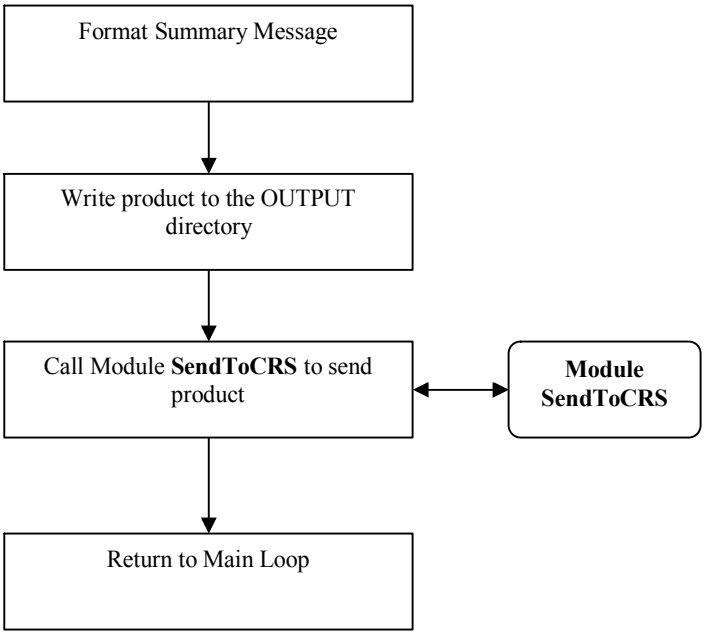
Flow Diagram for Module ClockTime



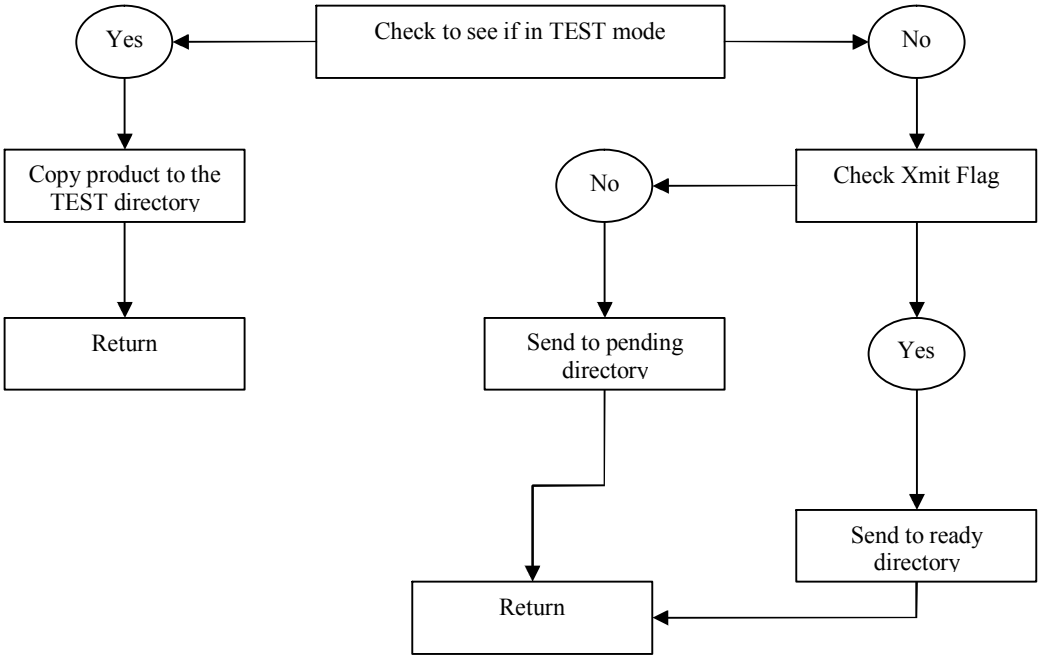
Flow Diagram for Module CreateSummaryMessage



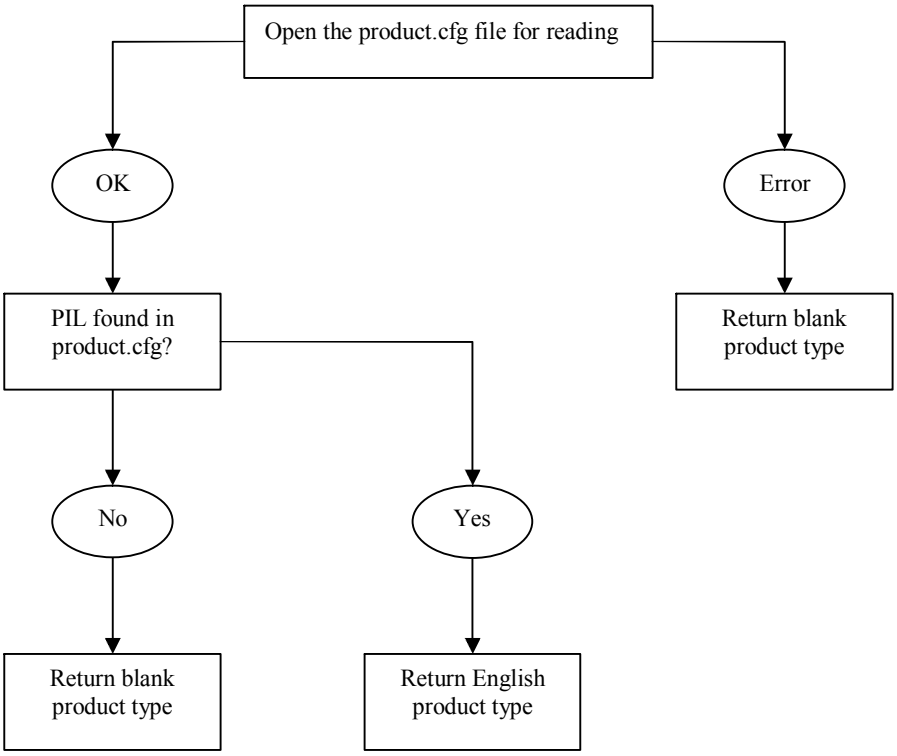
Flow Diagram for Module GenerateSummaryCRS



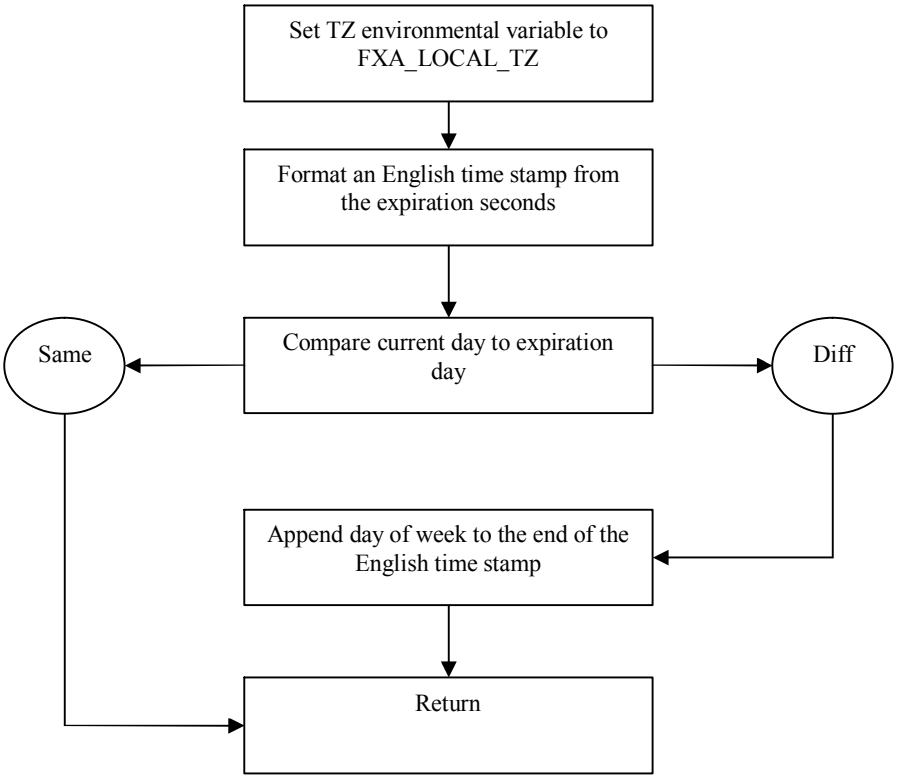
Flow Diagram for Module SendToCRS



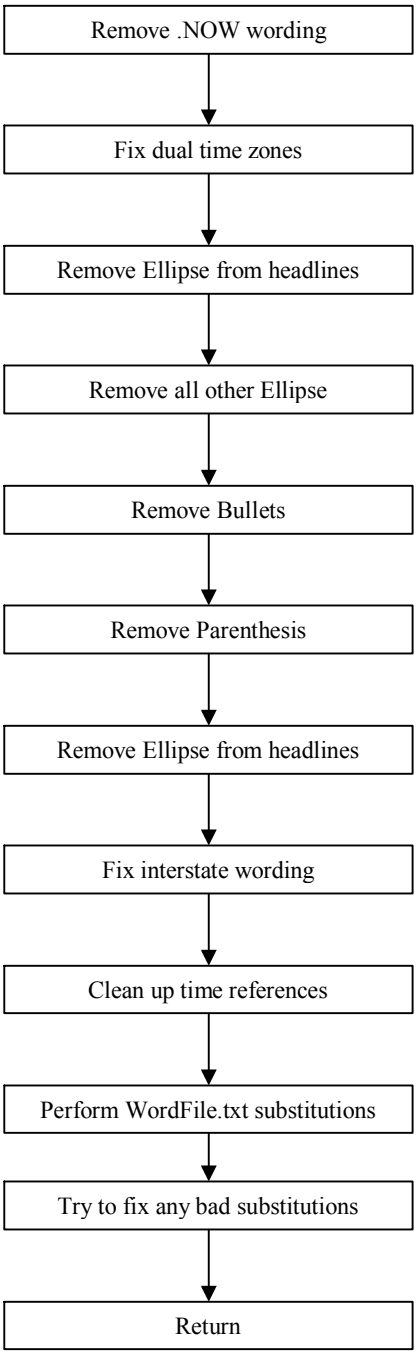
Flow Diagram for Module GetProdType



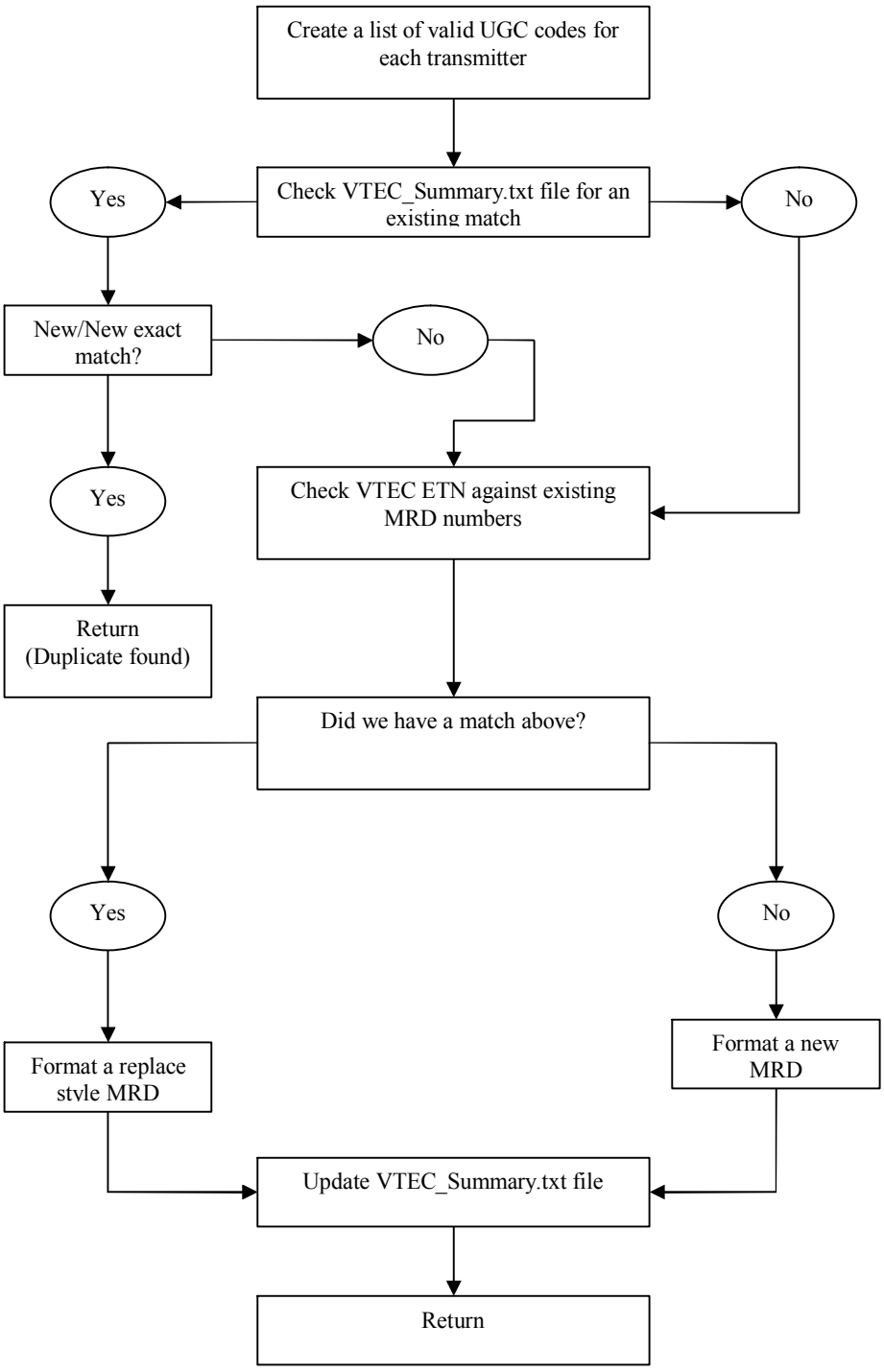
Flow Diagram for Module GetEnglishExpireTime



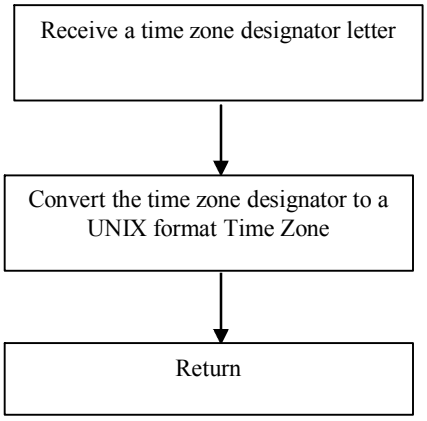
Flow Diagram for Module PostProcess



Flow Diagram for Module VTECSummaryStore



Flow Diagram for Module TimeZoneLookup



Flow Diagram for Module DecodeGLF